

THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

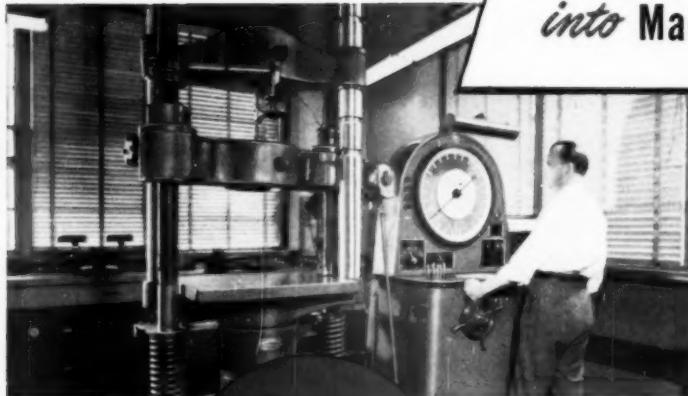




Seitz Limestone Service, Plainfield, Ill., uses this Mack six-wheeler for hauling and spreading limestone on farm acreage within a 50-mile radius of its quarry. It's a job that calls for a tough, dependable truck and Mack gets the call on both counts.

You get
more work out of
Mack Trucks

because...we
put more work
into Macks



Superior performance of Mack trucks is the result of uncompromising quality standards of materials, workmanship and engineering. These standards are safe-guarded by the most exhaustive research, testing and inspection in the truck industry. This massive test unit, for example, is used in Mack's research laboratory to determine tensile, compression and deflection strength of materials.

Mack

trucks for every purpose



6500

SINCE 1900, AMERICA'S HARDEST WORKING TRUCK

Mack Trucks, Inc., Empire State Building, New York 1, New York.
Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.;
Long Island City, N. Y. Factory branches and dealers in all principal
cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.



Hose that breathes scalding steam

A typical example of B. F. Goodrich product improvement

THAT'S a pile driver at work, driving those logs into the river bottom for a new dock as easily as you'd drive a tomato stake in your garden. Steam—388° hot—provides the muscle. The steam flows through that special hose and pushes up the big iron weight. The steam is cut off, down comes the weight, the stake gets a pounding.

But steam that hot burned any hose carrying it. Weakened by the burn, the hose would suddenly burst—scalding, sometimes even killing workers.

B. F. Goodrich, with experience in making hundreds of kinds of hose, set out to stop this danger and waste. First they developed a rubber for the lining—a new kind of rubber that stands extreme heat without burning.

Then, instead of cotton cords to bind the rubber (cotton burned, too) BFG used fine, flexible, strong wire—one size has a quarter mile of it per foot of hose. Then more heat-resisting rubber, asbestos cord, and wear-resisting rubber for the outer cover.

The result is a hose B. F. Goodrich

can call *Burstproof*. It has never been known to burst in service. On job after job it has lasted 4 and 5 times as long as any other hose ever used. It protects workmen, cuts replacement costs, keeps work flowing smoothly without shutdowns for repairs.

There is only one *Burstproof* steam hose made—B. F. Goodrich. For this safer, better hose call your B. F. Goodrich Distributor or write *The B. F. Goodrich Company, Industrial Products Division, Akron, Ohio*.

B.F. Goodrich
RUBBER FOR INDUSTRY

ROCK PRODUCTS

THE INDUSTRY'S RECOGNIZED AUTHORITY

APRIL, 1949

VOL. 52, No. 4

Bor Nordberg
Editor

Nathan C. Rockwood
Editorial Consultant

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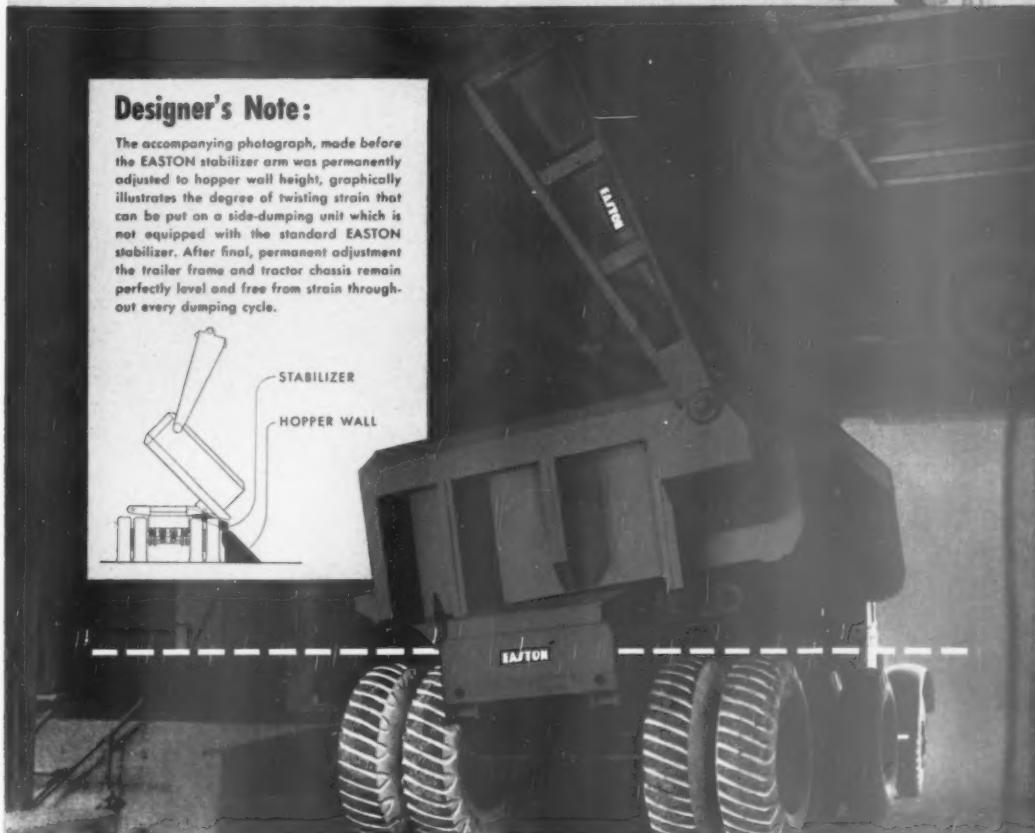
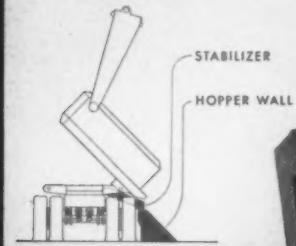
The Sensational New MODEL TL

Illustrating the large capacity lift-door trailer recently introduced by EASTON and now entering service in cement plant and iron mining operations. Available in capacities to thirty tons, or larger. Dumped by automatic overhead hoist.



Designer's Note:

The accompanying photograph, made before the EASTON stabilizer arm was permanently adjusted to hopper wall height, graphically illustrates the degree of twisting strain that can be put on a side-dumping unit which is not equipped with the standard EASTON stabilizer. After final, permanent adjustment the trailer frame and tractor chassis remain perfectly level and free from strain throughout every dumping cycle.



Dollars and Sense...

Shovel to crusher quarry haulage is a highly specialized operation. It affords a clean-cut opportunity for time and cost study, and for the application of highly efficient, special purpose methods and equipment. That's why haulage costs can be so extremely low with EASTON Special Purpose Trailers. For a free time and cost study of EASTON Trailer Haulage on your property, write to: Easton Car & Construction Company of Easton, Pa.

B-1033

PATENTED
DOORLESS PAN



LIFT DOOR



PATENTED
DROP DOOR



Model TRB • 14 to 20 tons

Model TL • 20 to 30 tons

Model TD • 20 to 30 tons

SPECIAL PURPOSE
EASTON
Trailers

Makers of Easton Mine and Quarry Cars
and Easton Heavy-Duty Truck Bodies

Limestone quarry of the Ralph Rogers Company, Franklin, Tenn. Drilling equipment

comprise 2 wagon drills, 2 pneumatic hammers, and one 500 cu. ft. compressor.



Why this large paving contractor uses **TIMKEN® Rock Bits**

The Ralph Rogers Company of Franklin, Tenn., operates a limestone quarry in connection with the production of asphalt aggregate.

Rock drilling at this quarry is a 100% Timken rock bit operation because the quarry operator has found Timken rock bits superior in performance and more economical in use than the bits previously used.

Furthermore, by preventing the steel from bottoming in the bit, the Timken one piece, solid steel shoulder construction has eliminated drill steel breakage that previously was a source of delay and expense.

No matter where you are, there's a Timken rock bit distributor within telephone call.

Conversion and reconditioning shops also are conveniently located for quick service. Put Timken rock bits to work now; cut drilling costs, increase production.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
ROCK BITS

THE TIMKEN ROLLER BEARING COMPANY
CANTON 6, OHIO - CABLE ADDRESS "TIMROSCO"

Smooth Controls



mean
higher
output

Watch a Northwest at work. Notice the freedom from stuttering; the freedom from false starts in the bank. Note how smoothly it swings, how accurately it "spots" its load, how quickly the dipper is back in the cut.

This smoothness is the result of a combination of things. The "Feather-Touch" Clutch Control takes the heavy work out of operation without the complications of tubing and pumps. The Uniform Pressure Swing Clutches take the jerks and grabs out of swinging and reduce adjustment and upkeep. The Northwest Dual

Independent Crowd utilizes force other independent crowd shovels waste for handling harder digging more smoothly. Add to this Northwest Simplicity of Design that makes upkeep and adjustment so easy. These things mean extra dippers in every hour.

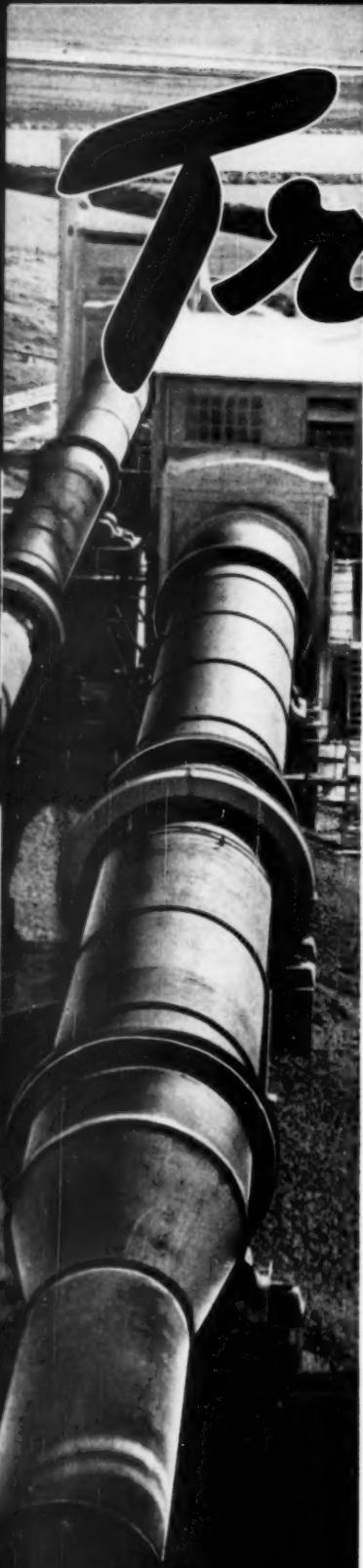
Northwest is a real Rock Shovel—the machine for the *Key Spots* at the heart of the job and you can't afford to have anything but the best for the heart of the job. Plan ahead now for more profitable equipment as your competition gets tougher. You'll need Northwest! "Follow the Crowd!"

NORTHWEST ENGINEERING COMPANY
1514 Field Bldg. • 135 South LaSalle St. • Chicago 3, Illinois

NORTHWEST

Convertible for any Mining Material Handling or Excavation Problem



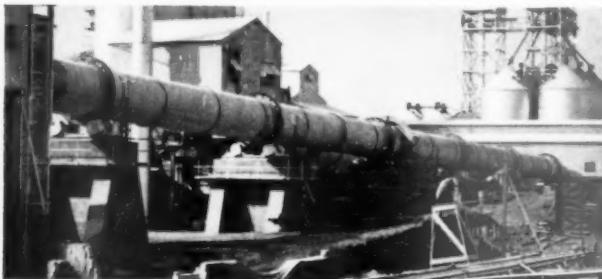


Traylor

... a MILE out in front with AG LIME producers

Because of its advanced design and superiority, Traylor Crushing and Processing Equipment has been specified by the foremost producers of lime and agricultural limestone for many years.

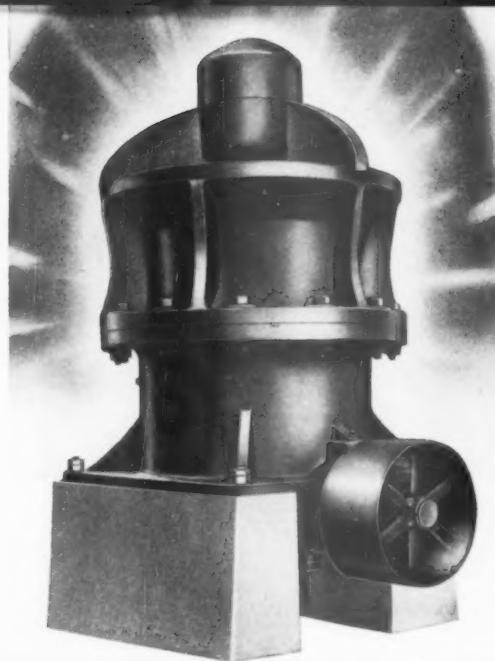
The installations shown are but a few of many, throughout the world, in which highly efficient Traylor equipment . . . crushing . . . calcining . . . cooling . . . is bringing greater operating economies and bigger profits to producers of lime products. Discover how the efficiency of your operation, too, can be brought to new heights with Traylor Equipment.



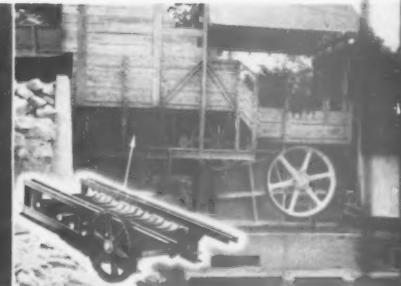
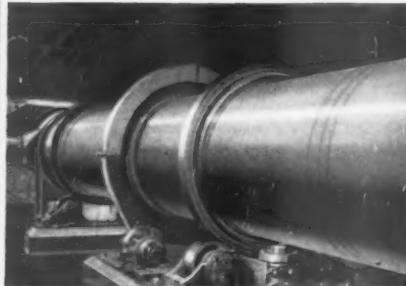
One of two Traylor Rotary Kilns used for burning lime in a leading West Coast Plant. 315 feet long, its rugged, all-welded steel shell and six sturdy, easily adjustable supports keep alignment perfect . . . make turning easy. Thermal efficiency is high and operation is simple with all controls conveniently grouped at a single station. Both kilns and control stations were designed by Traylor engineers and built to fit this particular operation.



A "Traylor" Leads to



3 foot Traylor TY Reduction Crusher reduces large tonnages of limestone per hour with great efficiency and maximum economy. Exclusive Traylor bell head and curved concaves are non-choking . . . convert more of the power applied to direct crushing force . . . outwear conventional fixtures by as much as 3 to 1. The reduced production costs these economies effect increase profits on ag lime sales.



Detail view of part of a 42' 0" Traylor Rotary Cooler of conventional design. Traylor regularly builds four standard types of rotary coolers, especially suited to operations in which there is limited space for equipment. All Traylor Coolers are characterized by expert design, finest materials and sturdy construction.

Fines are scalped from run-of-the-quarry stone and only oversize is fed to the jaw crusher. With this Traylor Grizzly Feeder, the steady, controlled flow of scalped material keeps crusher operation at peak efficiency and greatly reduces the amount of power used per ton of ag lime produced.

This plant's first step in profitably processing limestone to ag lime is shown above. Truck dumps stone from the quarry directly onto a Traylor Apron Feeder which delivers a constant, uniform feed to the Traylor Type H Jaw Crusher. Non-choking, smooth-face, curved jaw plates, exclusive with Traylor, out-produce and outwear conventional jaw plates.



Greater Profits

*Write for Processing Industries
Bulletin 3121 today.*

**TRAYLOR ENGINEERING & MANUFACTURING CO.
132 Mill Street, Allentown, Pa.**

Sales Offices: New York, N. Y., Chicago, Ill.,
Los Angeles, Calif.
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The PIONEER and still the LEADER!



JOY LIGHTWEIGHT WAGON DRILL

Introduced by JOY

8 years ago—hundreds
in use, nation-wide . . .

HERE'S WHY:



*Consult a
Joy Engineer*

- MORE HOLE PER SHIFT with the exclusive "drill and blow" feature.
- REALLY LIGHTWEIGHT—only 750 lbs.—less than half the weight of conventional wagon drills.
- Easily operated by ONE MAN; mounts JOY 3" or 3½" drifters, or 55 or 65 lb. sinkers.
- POSITIVE LOCKING BRAKES—requires no spikes.

WRITE FOR BULLETIN

WBD C 2073

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GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



Screening gold and silver ore with a single deck Symons Horizontal Vibrating Screen 42" wide and 10' long in a Mexican Mill.

Symons Screens

A Size and Type For Coarse or Fine Separation

FROM coarse scalping to accurate sizing of fine materials, there is a Symons Screen engineered for your job. With the various types and sizes of screening equipment available it is possible to select that which is best adapted to your conditions and to the materials to be screened, give the gradation of sizes desired and above all, produce those sizes at the lowest cost per ton. Nordberg engineers will be pleased to analyze your screening problems and recommend the screen or grizzly that will best suit your operating conditions.



VIBRATING BAR GRIZZLIES

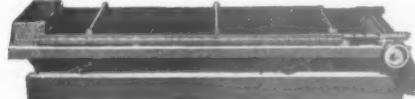
For scalping coarse materials. Powerful vibratory motion and non-clogging scalping action give this grizzly its great capacity and effective elimination of undersize, especially on wet, gummy or sticky materials. Ideal for operation ahead of secondary crushers.



M 449

ROD DECK SCREENS

Handles extremely heavy feeds on comparatively small openings, even with materials that are difficult to screen. Rapid discharge of the undersize gives this screen unusual capacity. Long life and easy rod replacement, plus high productive efficiency on difficult sizing jobs, result in low costs per ton of product screened.



HORIZONTAL VIBRATING SCREENS

Recommended for extreme accuracy in sizing. Full floating construction and unusual horizontal screening action permits rapid and uniform travel of material without any deck inclination. Flat screen requires minimum headroom, simplifies installation in confined locations. Can be furnished in single, double and triple deck models in a wide range of widths and lengths for any capacity and separation desired.

NORDBERG



Spiratory and
Jaw Crushers



Symons Cone
Crushers



Vibrating Screens
and Grizzlies



Grinding Mills



Mixed Equipment

Machinery for processing
ores and
industrial minerals

This Proved Program Offers Safe

1

CORRECT LUBRICATION

for every part
of every machine
you operate!

To help you cut "down-time"—keep hard-pushed machines operating full-till, full-time—Socony-Vacuum offers: technically correct oils and greases for *all* types of excavating and earth-moving equipment, tractors, power tools...oils made to help keep Diesel and gasoline engines cleaner, freer of deposits...top-quality gear and bearing lubricants that guard against excessive heat, friction and wear. Call in Socony-Vacuum today for full details.



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2

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- Here are just a few ways we help you ease tight work schedules, meet and beat contract deadlines:
- 1. Supply you with tested maintenance schedules adapted to your equipment, your set-up.
- 2. Give you practical help on "problem" machines.
- 3. Provide information on the Do's and Don't's of Correct Lubrication.
- 4. Supply the requirements for oils and greases for all of your equipment.
- 5. Help simplify lubricant inventory problems.

★ ★ ★
On the job, in the shop and in the office...all through your operation, this service saves time! See your nearest Socony-Vacuum Representative today for full details.

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SOCONY-VACUUM

Contractors' Service

Keeps machines on the job...
Speeds work progress!





YOU NEED "Sock"
FOR **ROCK**

**... and BIG or small
LORAINEs get the call!**

This big, burly Lorain-820 is one of two rugged rock busters in service for the Orange Quarry Company, West Orange, N. J. And the smaller Lorain TL-20 shovel, shown at the left, packs plenty of punch and power for Jim Stammer's operation down in Lewisburg, Tenn.

Where you dig in for keeps, the 2 yd. Lorain-820 is a natural. This heavy-duty shovel has the digging power and "sock" to keep rock moving from quarry to market year in and year out. The turntable features Center Drive direct-to-the-point power transmission plus a hydraulic coupling which serves as a "shock absorber" to relieve operating machinery and cables of heavy digging impacts and shocks. And supporting this "powerhouse" is a big 15'6" long, 2-speed chain drive crawler to insure firm footing in the roughest going. Be it the "big boy"—Lorain-820—or hard hitting TL-20, both machines in the Lorain line offer complete interchangeability of boom equipment. In addition to a crawler mounting, the TL-20 provides an alternate choice of highly mobile rubber-tire mounting for faster "foot work" between jobs.

Complete information on the Lorain line of crawler and rubber-tire mounted machines can be obtained from your local Thew-Lorain distributor. Why not contact him—today.



thew-Lorain®

CRANES • SHOVELS • DRAGLINES • MOTO-CRANES

THE
THEW SHOVEL COMPANY
LORAIN, OHIO

Measure Screen Value These 2 Ways...



CONSTRUCTION

Look at construction first — it has a lot to do with low maintenance and long screen life! Allis-Chalmers builds *Low-Head* vibrating screens of long-lasting high tensile strength steel alloys. All welded parts are "stress-relieved," eliminating local stresses caused by welding. Vibrating mechanism is independently and conveniently located on top of screen — out of the way. Its gears and bearings operate in oil-and-dust-tight steel housing.

Another important feature of the *Low-Head* screen is the cloth support frame designed to tension screen cloth properly. An increased number of supports and correct crown for different surfaces results in longer screen cloth life!

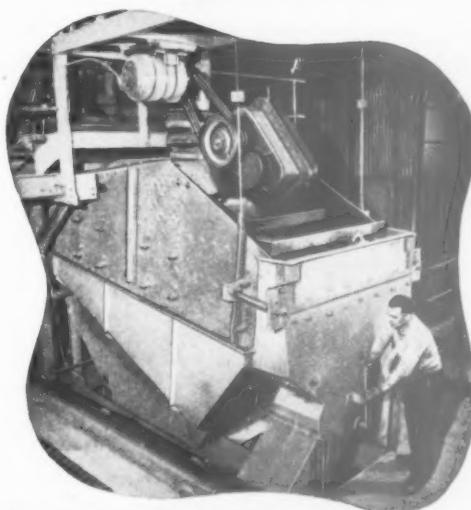
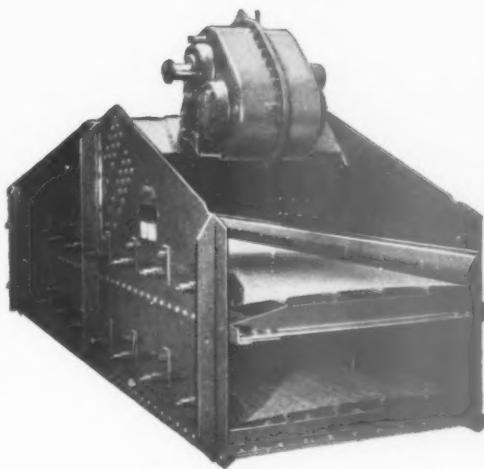


PERFORMANCE

How it works is an equally important measure of screen value. The compact *Low-Head* vibrating screen operates horizontally — saves valuable headroom and space. It can be used for either wet or dry screening... for dewatering... or as medium drain and wash screens in heavy density separations.

Straight-line motion at 45° to the horizontal results in rapid stratification of feed and a definite conveying action of the material. *Low-Head* screen sizes are from 26 in. x 8 ft to 6 x 16 ft; one, two or three decks. Write for Bulletin 07B6330A. ALLIS-CHALMERS, MILWAUKEE 1, WIS. *Low-Head* is an Allis-Chalmers trademark.

A 2517



— ALLIS-CHALMERS —



Jaw Crushers



Gyratory Crushers



Mills



Kilns, Coolers and Dryers



Hoists



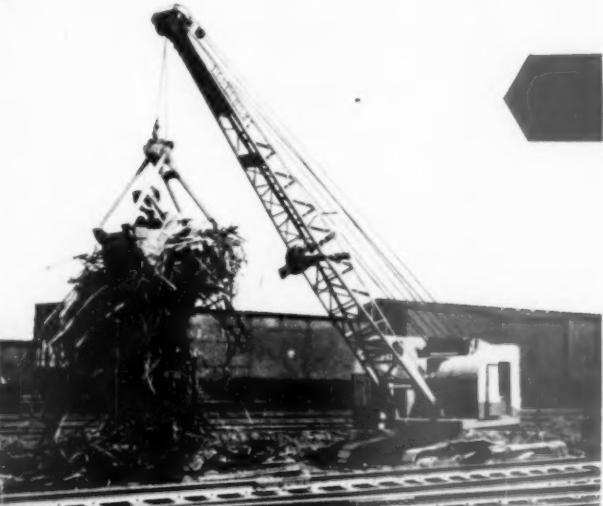
... and Other Equipment for the Crushing, Cement and Mining Industries

Koehring 205 for top



Full-revolving fairlead KEEPS CABLE COSTS LOW

In dragline service, Koehring 205 is easy on cable. Full-revolving fairlead maintains straight drag cable lead, with bucket at any working angle... eliminates short reverse bends. Result: longer cable life . . . more work-time.



KOEHRING COMPANY

MILWAUKEE 10, WIS.

Subsidiaries: JOHNSON • PARSONS • KWIK-MIX

1/2 yard

Independent traction Increases OUTPUT UP TO 50%

With Koehring heavy-duty $\frac{1}{2}$ -yard excavator, you get 2-speed traction that is independent of all other operations. Separate lever controls each crawler. 205 travels, swings, hoists, raises or lowers boom all at the same time. Whenever you move frequently, or change boom angles to change reach, this quick maneuverability steps up production as much as 50%.

Dual-purpose boom CUTS SHOVEL-PULL SHOVEL COSTS 25%

Rigid, heavy-duty 205 boom handles either $\frac{1}{2}$ -yard shovel or pull-shovel dipper. No need to change booms for either attachment. This Koehring feature costs 20 to 25% less than conventional units that require two separate booms. Crowd and retract cable is self-contained in boom. This saves more time and money every time you convert to dragline or clamshell crane.

Self-adjusting clutches ELIMINATE MANUAL SETTINGS

There's no time-out for continuous manual clutch adjustments . . . no "compromise" settings. Heat compensator springs on the 205's main drum, swing and traction clutches make all tension changes automatically . . . maintain full clutch efficiency at all times. Means bigger daily output . . . is particularly important on clamshell work where you have intermittent usage.

There are many more Koehring "plus" values that can increase daily production and lower costs on your work. It will pay you to get all the facts on this crawler or rubber-mounted $\frac{1}{2}$ -yd. 205. Other Koehring sizes: $\frac{3}{4}$ -yd., 304, $1\frac{1}{2}$ -yd. 605, and $2\frac{1}{2}$ -yd. 1005.



To: KOEHRING COMPANY, Dept. R, Milwaukee 10, Wisconsin

NAME _____
COMPANY _____
STREET _____
CITY _____

TITLE _____

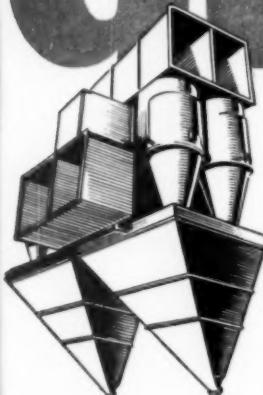
STATE _____

$\frac{1}{2}$ yd.
205 $\frac{3}{4}$ yd.
304

 $1\frac{1}{2}$ yd.
605 $2\frac{1}{2}$ yd.
1005

dust RECOVERY

Custom
Tailored



the agonizing trickle

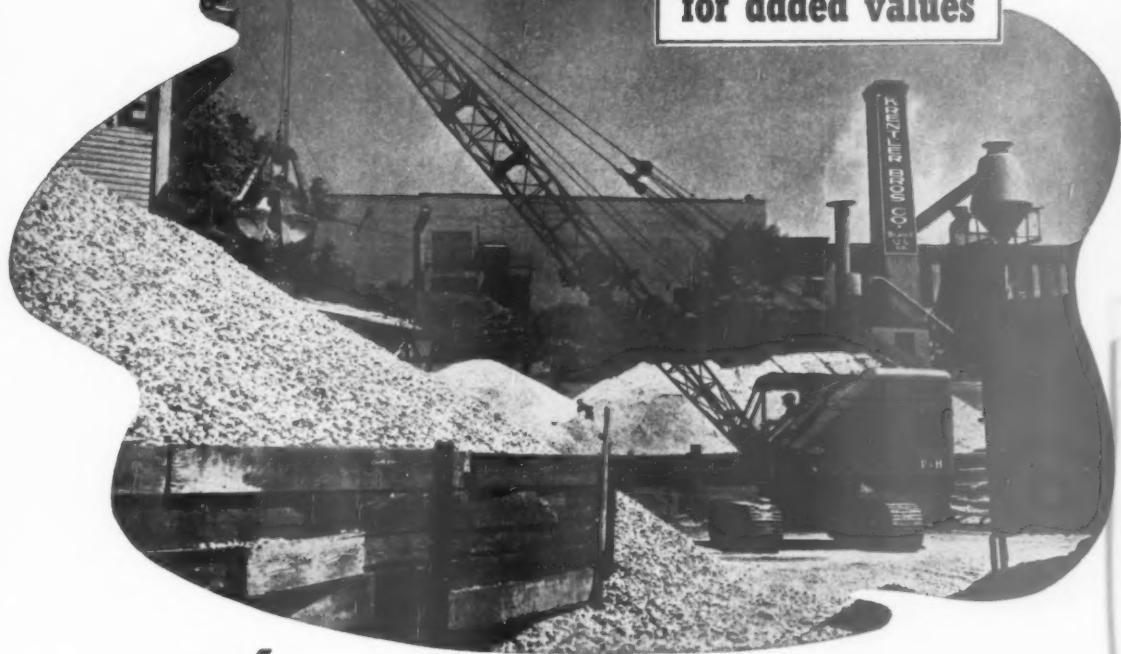
of maintenance costs won't add up to a costly dollar-pool, if your dust recovery system is custom-engineered by Buell. The large-diameter cyclones won't interrupt your operation by clogging. Individual inlets to each cyclone insure even distribution of dust-laden gas. The utter simplicity of a Buell cyclone prevents costly operating complications. With all this, the patented van Tongeren 'shave-off' makes operating efficiency surprisingly high. The money-saving facts are all in the new 32-page catalog. Write: Buell Engineering Co., 2 Cedar Street, Suite 5000, New York 5, N. Y.

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Engineered Efficiency in
DUST RECOVERY

look to

P & H

for added values



These added values

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- SPEED OPERATIONS

No matter what forms of materials handling your work calls for — in the pits or in the yards — these modern P&H's cut your costs with faster, easier operation.

Hydraulic Control — faster, easier, velvety action — easier on both machine and operator.

Planetary Chain Crowd — rapid reversing, more accurate; outlasts 25 to 30 crowd cables.

True Tractor Type Crawlers — more dependable travel; more maneuverable; easier steering. You can make sharp or gradual turns or right-about-face without stopping.

Welded Construction Throughout — rolled alloy steels make them huskier, shockproof. There's no needless dead weight.

Ask for complete information on these and other P&H Added Values.



P&H Excavators are built in all sizes and types through 6 cubic yards capacity; gasoline, Diesel or electric powered. Write for literature.

P & H

EXCAVATORS
4465 West National Avenue
Milwaukee 14, Wisconsin

HARNISCHFEGER
CORPORATION

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HOISTS • WELDING ELECTRODES • MOTORS

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You can depend on Primacord to give you sure-fire results when the going gets rough. Branch lines down each hole initiate instantly the entire charge from top to bottom. Problems of deck loading are simplified by the use of Primacord. When you shoot, each charge goes with peak explosive power. You get thorough fragmentation—the kind that keeps big equipment on the move.

Primacord is flexible, easy to handle . . .

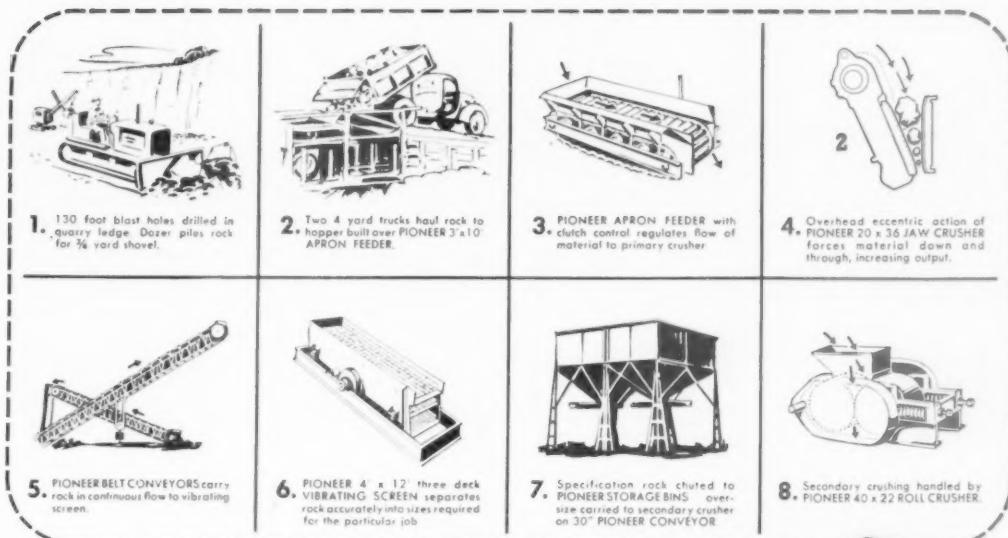
it hooks up quickly with simple square knots or half-hitches. It's wound on spools that are a cinch to carry and unreel as loading operations move along. Insensitive to stray currents, it's the logical detonator to use around high-voltage electrical equipment.

There's a grade of Primacord to meet every blasting condition. Ask your explosives supplier; or write us direct. The Ensign-Bickford Co., Simsbury, Connecticut.

P-29

PRIMACORD-BICKFORD Detonating • Fuse •

HOW 9 MEN DO THE WORK OF 125 AT THE "BEE ROCK" QUARRY

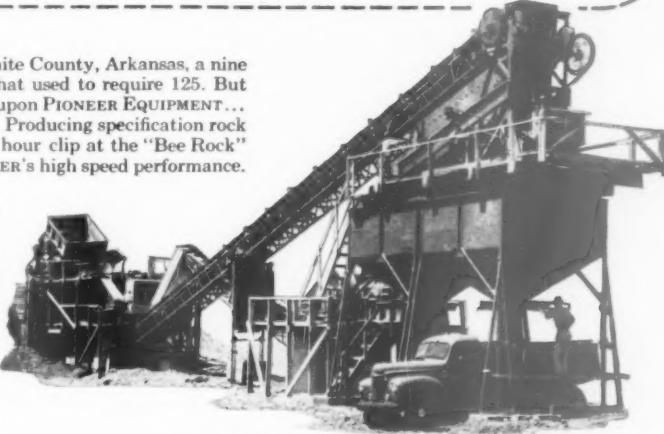


At this quarry near Searcy, in White County, Arkansas, a nine man crew is getting a job done that used to require 125. But hardly alone. The bulk of the work falls upon PIONEER EQUIPMENT... the proved leader in low-cost operation. Producing specification rock for road construction at a 120 ton per hour clip at the "Bee Rock" quarry is just another tribute to PIONEER's high speed performance.

This smooth-running quarry plant is a perfect example of why we call PIONEER EQUIPMENT... *Continuflow* EQUIPMENT. Low maintenance . . . balanced units . . . increased output. "Bee Rock" is a tightly-knit, high production PIONEER *Continuflow* QUARRY PLANT, assuring its operators of consistently higher output, with lower upkeep.

Your pit, mine and quarry problems can easily be solved with PIONEER EQUIPMENT. We can give you prompt delivery on orders placed now.

PIONEER ENGINEERING WORKS
1515 Central Avenue • Minneapolis 13, Minnesota

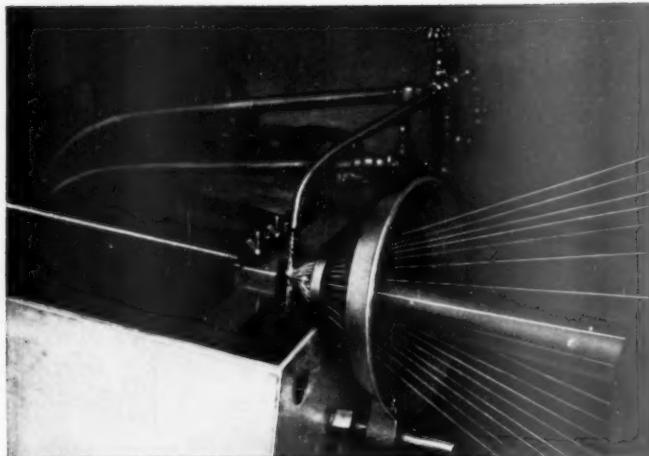


IN ADDITION to making quarry plants like this one, Pioneer also builds portable quarry and gravel plants, washing plants, asphalt plants as well as feeders, crushers, screens and conveyors.

BUY BOTH!
Higher Output,
Lower Upkeep!

Pioneer

Continuflow EQUIPMENT



Hot Oil Treatment for Steel Muscles

THIS 82-PAGE BOOK ON
WIRE ROPE IS FREE. WRITE
FOR YOUR COPY TODAY!

Thousands of wire rope users have found that the information packed in the pages of "Know Your Ropes" has made their work easier. It's full of suggestions on proper selection, application and usage of wire rope. It's easy-to-read and profusely illustrated. For your free copy, write—Wire Rope Sales Office, Wickwire Spencer Steel, Palmer, Mass.



Field lubrication of wire rope does much to prevent friction and corrosion and should not be neglected. However, it is only a *surface* treatment. To provide proper *internal* lubrication, every strand of Wickwire Rope is actually formed in a stream of hot, quick-setting lubricant which packs the many spaces between the wires of the strand.

Fiber cores, too, are saturated with a compound that lubricates the strands after the rope has been put in service. This built-in protection is the result of years of study to develop a lubrication system that would afford protection against factors which bind ropes and result in loss of strength and rope life.

Thorough lubrication is only one step in the quality control of Wickwire Rope manufacture—but we at Wickwire believe that *every* step is important to assure finished rope that will provide the utmost in performance, safety and long life.

Wickwire Distributors and Rope Engineers are always ready to help solve your wire rope problems and supply the right rope for your needs. Wickwire Rope is available in all sizes and constructions, both regular lay and WISSCOLAY Preformed.

WICKWIRE ROPE

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass.

EXECUTIVE OFFICE—500 Fifth Avenue, New York 18, N. Y.

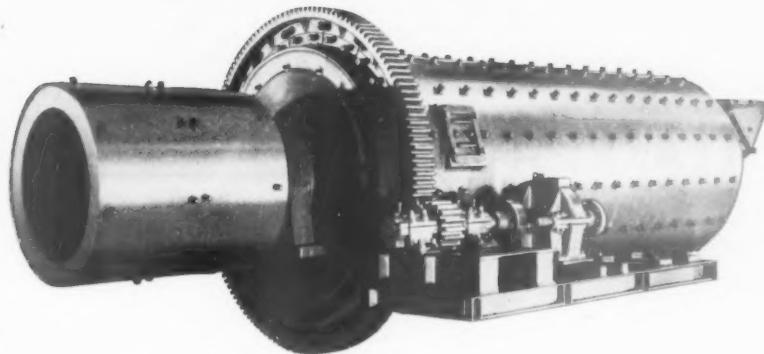
SALES OFFICES—Abilene (Tex.) • Boston • Buffalo • Chattanooga • Chicago • Denver • Detroit • Elmtown (Pa.) • Fort Worth • Houston • New York • Philadelphia • Tulsa

PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corporation, Oakland 6, California





"What Can a Blade Mill Do for Me?"



IT CAN CUT YOUR WASHING COSTS...

Because they have big capacities, *blade mills* save money washing large tonnages. When you specify *Allis-Chalmers blade mills* you save in another way, too —

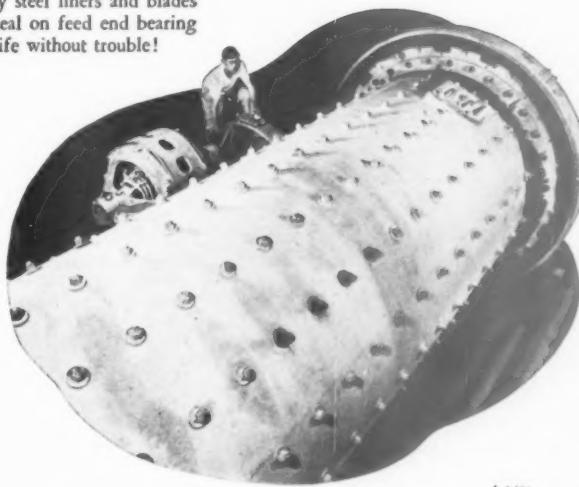
You'll get maximum durability. *Allis-Chalmers mills* have all-welded steel plate construction . . . alloy steel liners and blades . . . extra large bearings . . . a special seal on feed end bearing that prevents backwash of pulp. Long life without trouble!

IT CAN CLEAN HARD-TO-WASH FEED . . .

Nothing beats a *blade mill* for tough washing jobs. Angularly adjustable blades provide a combined cutting and washing action that scrubs contaminants from feed up to 10 inches in size.

However, for medium size materials having less tenacious contaminants, a *log washer* may be satisfactory. And for easy-to-wash materials, either a *revolving scrubber* or *screw washer* may be best.

Whichever you need, you'll get an unbiased recommendation from *Allis-Chalmers*, for A-C builds all types. Your local A-C representative will help you choose the washing equipment most economical for your job. **ALLIS-CHALMERS, MILWAUKEE 1, WIS.**



A 2472

ALLIS-CHALMERS
BLADE MILLS

Combine Sound Engineering
with Proven Performance!

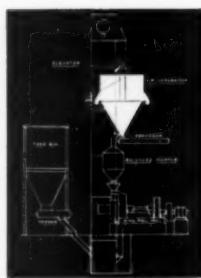


ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products

STURTEVANT AIR SEPARATORS

*Produce
Aggregates
that meet
Government
Specifications*



Sturtevant Air Separator in "closed circuit" with pulverizer. This combination increases tonnage and reduces costs in all types of industry.



Range 10 to 200 mesh. Use this mill in closed circuit with Sturtevant Air Separators.

On dam projects throughout the country, Sturtevant Air Separators are helping contractors meet U. S. Corps of Engineers specifications for proper analysis of aggregates. Here's how — Sturtevant Air Separators de-dust and remove the fine fraction according to the mesh required. Dry or damp sand can be handled in any tonnage desired in ranges from 30 mesh and finer to eliminate screen in the production of intermediate sizes.

The de-dusted sand of proper mesh is then inter-blended with the screened sand or aggregates in the proper proportions providing aggregates that meet specifications.

Sturtevant Air Separators are fast and accurate. They increase production of aggregates, cut production costs. Investigate Sturtevant Air Separators for your jobs. Write for details, today.

STURTEVANT MILL COMPANY

102 CLAYTON STREET, BOSTON 24, MASSACHUSETTS

Designers and Manufacturers of: CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS
MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS



Quick turn around! "Caterpillar" Diesel DW10 wheel-type Tractor with "Caterpillar" W10 Wagon being loaded with crushed rock on a road-building job for Rogers Construction Co., Portland, Oregon. The W10 dumps in windrows through bottom. This team averaged six 18-mile round trips per day with an average load of 15 cu. yds. (Price of a standard DW10 Tractor is \$10,450; W10 Wagon, \$4950, F.O.B. Peoria, subject to change without notice.)

Hurry-up hauler!



"Caterpillar" Diesel DW10 wheel-type Tractor with Athey PD-10Q Trailer (hydraulically controlled) being shovelf loaded on a job near Fairchance, Pa. The PD-10Q is side-dump built and designed for heavy rock.

THE JOBS pictured here are different, but they show one piece of equipment in common. That's a husky, high-speed "Caterpillar" Diesel DW10 wheel-type Tractor. Teamed with a "Caterpillar" W10 Wagon for aggregate hauling or an Athey PD-10Q Trailer for hauling rock, this fast stepper keeps things rolling in pit and quarry work. Jobs like stock-piling, excavating and supplying a crushing plant are naturals for the DW10.

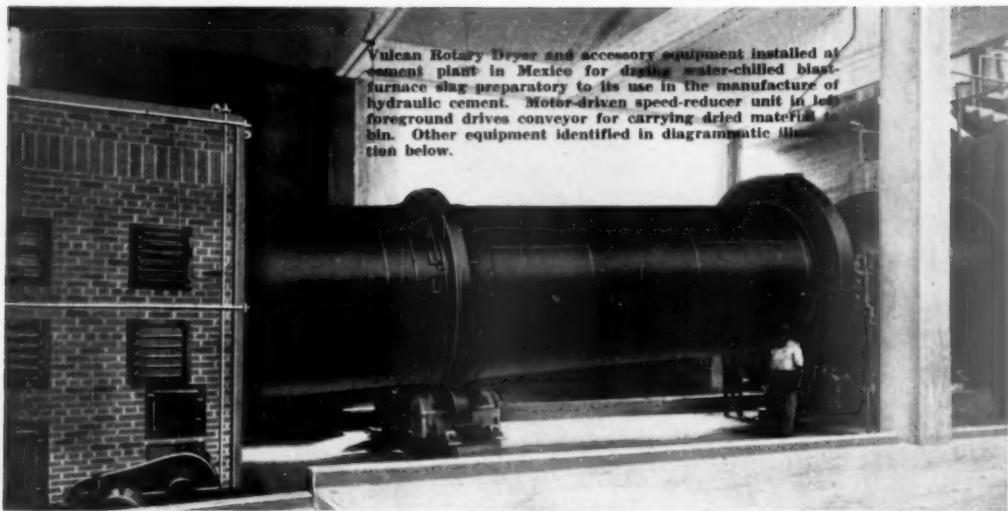
The high operating availability time per hour of "Caterpillar" Diesel DW10s provides their users with another money-saving plus. They're soundly

built to stay on the job day in and out, and records show they do. All things considered—high speed, high availability time and low cost of operation—they're an outstanding buy.

Check the advantages of these hurry-up haulers today with your competent, fully equipped "Caterpillar" dealer.

CATERPILLAR TRACTOR CO., PEORIA, ILL.

CATERPILLAR
REG. U. S. PAT. OFF.
DIESEL
ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT



Vulcan Rotary Dryer and accessory equipment installed at cement plant in Mexico for drying water-chilled blast-furnace slag preparatory to its use in the manufacture of hydraulic cement. Motor-driven speed-reducer unit in foreground drives conveyor for carrying dried material to bin. Other equipment identified in diagrammatic illustration below.

Vulcan Rotary Dryers are backed by a

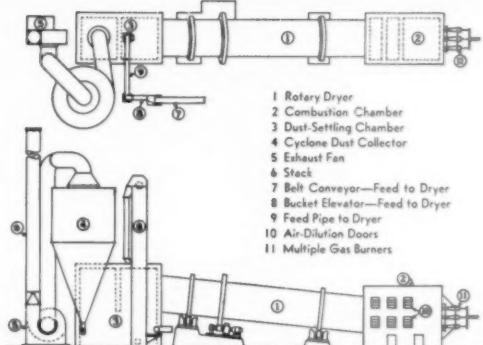
HUNDRED YEARS

of Successful Manufacturing Experience

Not many manufacturing companies in this country have operated continuously and successfully for a hundred years. That the Vulcan Iron Works has achieved this distinction is, in itself, an indication of uniformly high standards in both the design and construction of its many products for users of heavy industrial equipment.

For more than fifty years we have furnished a constantly increasing variety of Rotary Kilns, Coolers, Dryers, Retorts, etc., to the rock products, chemical processing and metallurgical industries. The widely diversified experience thereby acquired is always at the service of prospective purchasers and often enables our engineers to make money-saving suggestions.

Correspondence regarding the drying, calcining or cooling of any inorganic material is cordially invited. Estimates, constructive suggestions and preliminary designs will be submitted, as far as possible, without charge or obligation.



Plan and elevation of Vulcan dryer installation shown above. Provision is made for delivering a large volume of hot gases to dryer at relatively low temperature, which can be controlled within narrow limits—also for collecting and reclaiming dust. Other carefully-engineered features assure high efficiency at minimum expense for operation and maintenance.

Vulcan Iron Works

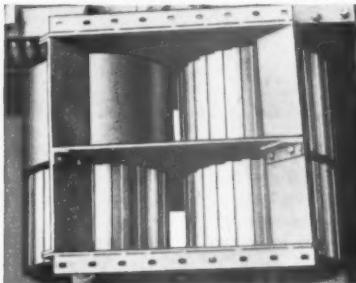
Established
1849 WILKES-BARRE, PA., U.S.A.

Cable Address
"Vulworks
Wilkes-Barre"

Other Vulcan products include all types of Industrial Locomotives, Electric Hoists, Mining Machinery, Sugar-Mill Machinery, Heavy Special Machinery, Fabricated Steel Products and Open-Hearth Steel Castings up to 20 tons in weight. Bulletins on request.

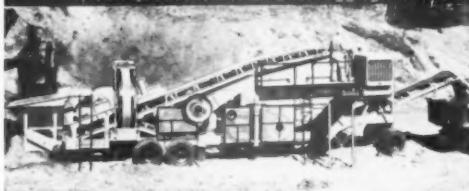
UNIVERSAL TWIN DUAL ROLLS OUT-PRODUCE CONVENTIONAL ROLLS OF LARGER DIAMETER

As the percentage of Crushing increases, the increased production becomes even more outstanding



Wide opening (bottom set of rolls) of the **TWIN DUAL** roll crusher permits wider primary jaw crusher discharge opening with corresponding increase in capacity. Narrow opening rolls for finishing stage of reduction.

Two great UNIVERSAL plants with 3 stages of reduction
For many years they have set the pace for volume production of finished aggregate.



TDM 24 **TWIN DUAL** Master Gravel Plant



293Q **TWIN DUAL** Pacemaker for rock or gravel



Universal **TWIN DUAL** Rolls give the approximate results of two separate roll crushers without the bulk and weight. Two sets of different diameter rolls are mounted on common shafts and operate simultaneously. Having different diameters, one set has a wide opening, the other a narrow opening between the rolls. (See illustration).

When "Stream-Flo" engineered with the Universal overhead eccentric jaw crusher, this exclusive Universal development makes possible 3 full stages of reduction in a single portable plant.

1st stage—jaw crusher

2nd stage—wide opening of **TWIN DUAL** Rolls

3rd stage—narrow opening of **TWIN DUAL** Rolls

All material requiring crushing is spouted separately to the proper unit. There is no unnecessary routing of material to any crusher.

TWIN DUAL rolls permit up to 100% wider jaw discharge opening, resulting in greater primary capacity, eliminating the usual bottle neck of a crushing plant. Result—More yards per hour at less cost per yard.

For profit-making capacity that challenges comparison—for portability to move quickly to any job, investigate Universal's **TWIN DUAL** rock and gravel plants. Write for Bulletins No. 31AA and No. 682.

Ask about our 800 **TWIN DUAL** Secondary Plants.

THE UNIVERSAL ENGINEERING CORPORATION
617 C Avenue, N. W.
CEDAR RAPIDS, IOWA

A Division of PITTIBONE MULLIKEN CORPORATION • Chicago • New York

OTHER PITTIBONE MULLIKEN PRODUCTS... PUMPS, CLAMSHELL AND DRAGLINE BUCKETS, SPEED LOADERS, CONVEYORS OF ALL KINDS, CAR UNLOADERS

Cedarapids

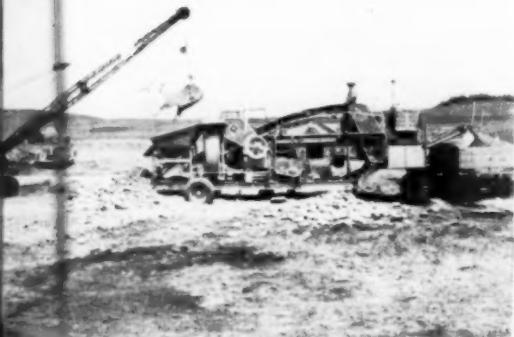
Built by
IOWA

LOW INITIAL COST
plus
LOW MAINTENANCE COSTS

CRUSHING AND SCREENING PLANTS



900 CUBIC YARDS of 1" material and 725 cubic yards of $\frac{3}{4}$ " produced in 9 hours by this Cedarapids Portable Unitized Crushing and Screening Plant in Wisconsin. The plant consists of a jaw crusher primary and a roll crusher secondary.



100 CUBIC YARDS
per hour of $\frac{3}{4}$ " aggregate from this Cedarapids Junior Tandem. This plant is operating between the Elk River and Big Lake in Minnesota, producing aggregate for gravel surfacing shoulder and for black topping intersections.



35 CUBIC YARDS an hour with 55% of material crushed. That's easy production for this Cedarapids Pitmaster, the smallest complete tandem portable crushing and screening plant in the Iowa line. Operating in Canada.



260 TONS per hour with 35% crushing of minus 1" material! That's the production record of this Cedarapids Master Tandem Portable Crushing and Screening Plant in Colorado. (above)

Cedarapids

Built by
IOWA

IOWA LINE OF MATERIAL HANDLING EQUIPMENT INCLUDES:
ROCK AND GRAVEL CRUSHERS • SELF CONVEYORS • STEEL BINS • BUCKET ELEVATORS •
VIBRATOR AND REVEOVED SCREENS • STRAIGHT LINE ROCK AND GRAVEL PLANTS •
PREDIERS • TRAPS • PORTABLE POWER CONVEYORS • PORTABLE STONE PLANTS • PORTABLE
GRAVEL PLANTS • REDUCTION CRUSHERS • BATCH TYPE ASPHALT PLANTS • CHASSEURS •
DRAG SCRAPER TANCS • WASHING PLANTS • SOIL COMPACTION UNITS • CYCLONE VEHICLES
AND TRAILERS • JAW AND IMPACT BREAKERS • See Your Cedarapids Distributor for Full Details

assure LOW COST PER YARD

BITUMINOUS MIXING PLANTS

WHATEVER your bituminous paving projects, you'll get bigger annual savings when you put Cedarapids Bituminous Mixing Plants on the job. Every feature is engineered for high tonnages accurately mixed at lowest possible cost. Perfectly matched screens, batchers, pug mills, elevators and driers assure a smooth, steady flow of uniform mixes that consistently meet the most exacting specifications. Finger-tip operating control assures fast, easy operation. Low over-all travelling dimensions and weight simplify transportation problems. Rock-bottom initial cost, plus low operating and maintenance costs, keep you in the profit picture. Cedarapids Portable, Stationary, Batch-Type and Continuous-Mix Plants are available in sizes and types for every requirement. When you buy a Bituminous Mixing Plant, buy the best — buy Cedarapids.



As much as **350 TONS** per day of bituminous materials, thoroughly mixed, were produced by this Cedarapids Super-Portable Model "FA" in Ohio. *(above)*

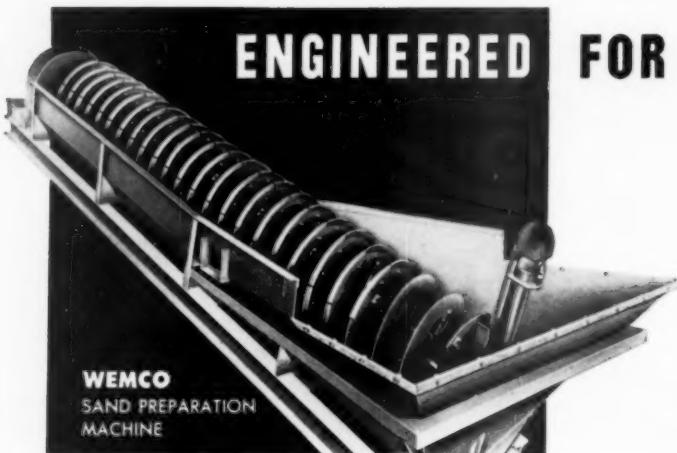
100,000 TONS
of thoroughly mixed bituminous material produced by this 3000 lb. Cedarapids Model "E" Batch-Type Bituminous Mixing Plant and another 2000 lb. Model "E" Batch-Type Plant for resurfacing airport runways. *(right)*



20 TO 30 TONS per hour production is obtained from this Cedarapids Portable Patchmaster, a volumetric type bituminous mixing plant in Iowa.



200 TO 250 TONS per day produced by this Cedarapids 1000 lb. Model "A" Bituminous Mixing Plant in Alabama. Another production record for Cedarapids.



View of overflow discharge



Sand discharging to conveyor

FOR EFFICIENCY!

WEMCO
SAND
PREPARATION
MACHINES
GIVE

GREATER CAPACITY
CLEANER SANDS
MORE PROFITS

MAXIMUM PRODUCTION

Up to 100% greater capacity of dry, clean sands is provided because spiral design gives more rapid sand conveyance. Maximum settling of sands and overflow of waste is accomplished by a large tank and wide weirs.

MINIMUM COSTS

Proper balance between sand raking and waste overflow means maximum desired sand recovery at lower cost per ton. Automatic operation, low H.P. requirements, and sealed, long-life bearings reduce attendance and maintenance costs to a minimum.

DEPENDABLE OPERATION

Many years experience with sand preparation problems has resulted in machines designed for continuous, heavy duty operation. All parts are ruggedly constructed of quality materials to assure exceptional durability with minimum interruption.

Write for new Bulletin C-1-0-1 to help solve your sand preparation problems.

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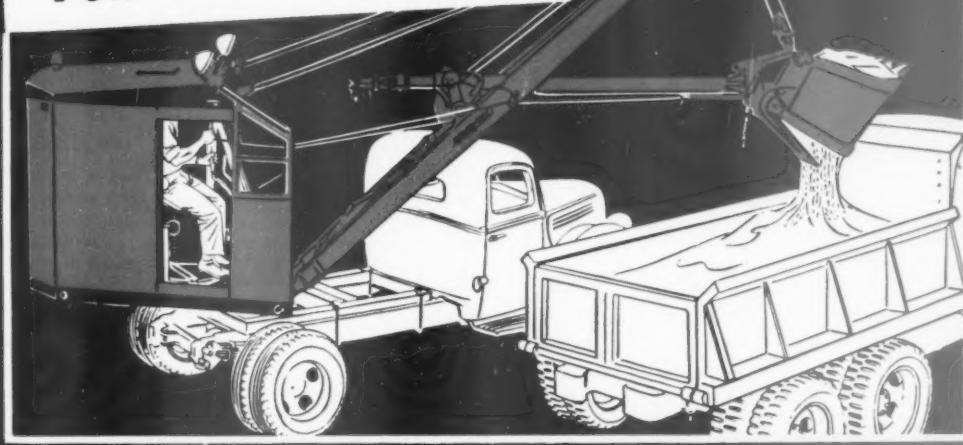
WESTERN MACHINERY COMPANY

760-766 FOLSOM STREET • SAN FRANCISCO 7, CALIFORNIA

WKE (HMS) Mobil-Mill • Coal Spiral • Standard Thickeners (HMS) Thickeners • (HMS) Media Pumps • Hydroseparators (HMS) Densifiers • (HMS) Separatory Cones • "SH" Classifiers Sand Pumps • Conditioner and Agitators • Fagergren Flotation Machines • Dewatering Spirals • (HMS) Laboratory Units

**CHOOSE
"QUICK-WAYS"
FOR SURE PROFITS**

REG. U. S. PAT. OFF.



PORABILITY AND CAPACITY . . . these are the fundamentals you KNOW you want in a truck shovel. You get **PORABILITY** in a "QUICK-WAY" because it is built of steel for lightness and strength, no heavy counter-weights to slow you down. You get **CAPACITY** because balance and stability are designed into your "QUICK-WAY".

In addition you get **SPEED . . . PERFORMANCE . . . VERSATILITY . . . INTERCHANGEABILITY . . . SIMPLICITY . . . ECONOMY OF OPERATION . . . LOW FIRST COST . . . LOW MAINTENANCE . . . and EXTRA PROFITS.**

A "QUICK-WAY" mounts on ANY standard truck of proper size to go anywhere a truck can go at truck speed. A "QUICK-WAY" is CONVERTIBLE IN MINUTES from Shovel to CRANE, DRAGLINE, CLAM-SHELL, PILE DRIVER, SCOOP, TRENCH-HOE or BACK FILLER. You buy only the attachments you want. A "QUICK-WAY" is simply built, with many interchangeable parts, all easy to service . . . and durable.

THE FUNDAMENTALS built into every "QUICK-WAY" add up to sure profits on a small investment, with one of the most useful machines you can own.

NO MATTER WHAT OTHER EQUIPMENT YOU OWN, you need "QUICK-WAYS" too. There's a "QUICK-WAY" owner near you; ask HIM.

• Service available from Distributors strategically located throughout U.S. Others worldwide



MODEL E: 4/10 cu. yd. cap. for mounting on any standard 5-ton truck.
MODEL J: 1/4 cu. yd. cap. for mounting on any standard 1½-ton truck.

For speed, portability, economy of operation, and adaptability to a wider range of jobs, nothing of comparable size equals a "Quick-Way" Truck Shovel.

"QUICK-WAY" TRUCK SHOVEL CO.
DENVER, COLORADO

What it takes to stay heavyweight champ 17 years



1. Real heavy-duty truck reputation!

To haul lots of oil, you pick a he-man truck that's made for the job. You pick a truck with a record of performance that shouts "TOUGH!" You pick an International Truck.

Registration figures show that for 17 straight years Internationals have led the heavy-duty truck field.



2. Real heavy-duty power!

On construction jobs you need a truck that can take a pounding . . . a truck with a powerful engine, a rugged frame, sturdy strength through and through.

You find trucks like that at International Harvester . . . a builder of truck power for 42 years, a manufacturer who knows what tough trucks need.



3. Real heavy-duty truck engineering!

On big logging jobs you need size, brute strength and power . . . specialized by people who know your job in terms of trucks.

International heavy-duty trucks are big, tough, powerful—and specialized to handle the toughest hauling jobs. That's our engineering tradition.



5. That's why International trucks are heavyweight champs for heavy-duty jobs—

For 17 straight years, International heavy-duty trucks have been America's first choice for heavy-duty work. Registration figures prove it. In trucks having gross weight ratings over 16,000 pounds, Internationals are so far ahead of the field that the heavyweight crown carries a Triple Diamond emblem.

Right now, International Dealers and Branches can give you quick delivery on

International heavy-duty trucks . . . specialized trucks, engineered and powered for your job.

Your nearest International Truck Dealer or Branch will be glad to send a qualified transportation engineer to analyze your hauling problem, to give you facts and figures on equipment to meet your specific needs, to answer any questions you may have. Call him soon.



4. Real heavy-duty truck stamina!

Housing is a big job where you measure truck toughness by years of getting the work out and keeping the costs down on all hauling operations.

You can count on years of service from International heavy-duty trucks. The nation's largest exclusive truck service organization is set up to keep Internationals operating at peak efficiency, over the long haul.

Other International Harvester Products
Farmall Tractors and Machines
Industrial Power . . . Refrigeration



Tune in James Melton and "Harvest of Stars"
NBC, Sunday afternoons

INTERNATIONAL TRUCKS

INTERNATIONAL HARVESTER COMPANY • CHICAGO

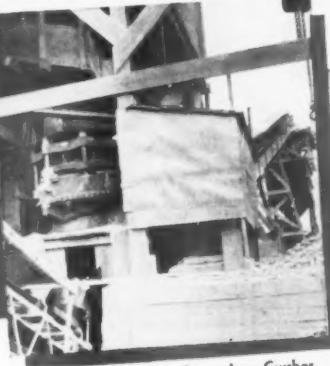
FLEXIBLE TELSMITH PLANT MAKES

200
TONS
HOURLY

5 Sizes, WASHED GRAVEL
3 Sizes, CRUSHED GRAVEL
2 Sizes, SAND



Telsmith Two-Deck Pulsator
Telsmith Jaw Crushers



Telsmith Gyrasphere Secondary Crusher

Telsmith Hercules Washing Screen



• The MANCHESTER SAND, GRAVEL & CEMENT CO. plant at Manchester, New Hampshire, is turning out 200 tons of aggregate an hour—to supply federal, state, city and private jobs. Deliveries are made by trucks and railway cars.

This flexible Telsmith-equipped plant is making 5 sizes of washed gravel: $3\frac{1}{2}''$ - $1\frac{1}{2}''$ (100% crushed), $1\frac{1}{2}''$ - $1''$, $1''$ - $\frac{3}{4}''$, $\frac{3}{4}''$ - $\frac{1}{4}''$, $\frac{3}{8}''$ - $\frac{1}{2}''$ —3 sizes of crushed gravel: $\frac{3}{4}''$ - $\frac{1}{2}''$, $\frac{3}{8}''$ - $\frac{1}{4}''$ minus $\frac{1}{4}''$ —2 sizes of

sand: minus $\frac{1}{4}''$ concrete sand, and mason sand. It can also make bank-run sand and gravel with oversize crushed.

Mr. P. H. ("Pete") Rice, president of the company says, "We have been completely satisfied with every piece of Telsmith equipment that we have had and the service has been excellent." Telsmith capacity, flexibility, product quality and economy will satisfy you. Get Bulletin G-11

TELSMITH Equipment in This Plant

84" x 5' Plate Feeder
4' x 8' 2-Deck Pulsator
10" x 30" Roller Bearing Jaw Crusher
10" x 36" Roller Bearing Jaw Crusher
4' x 10' 3-Deck Pulsator
36" Telsmith Gyrasphere Secondary Crusher
80" x 22' long Hercules Washing Screen
2' x 6' 1-Deck Pulsator
Two—28" x 12' Single Screw Rewashers
No. 6 Sand Tank
3' x 10' 3-Deck Pulsator

G-16

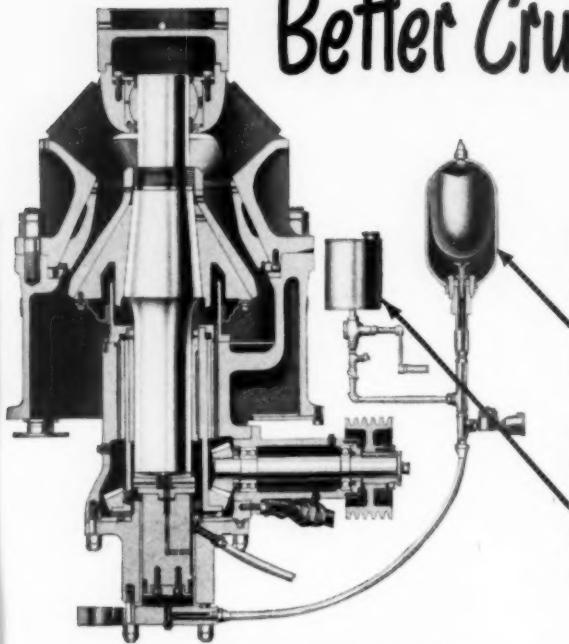
SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

Cable Address: Sengworks, Milwaukee

51 East 42nd St. 211 W. Wacker Drive 713 Commercial Trust Bldg. 238 Main Street
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• Rish Equipment Co., Charleston 22, & Clarksburg, W. Va.—Roanoke 7, & Richmond 10, Va. • Wilson-Weesner-Wilkinson Co., Knoxville 8, & Nashville 6, Tenn.

These TWIN FEATURES give you Better Crushing!



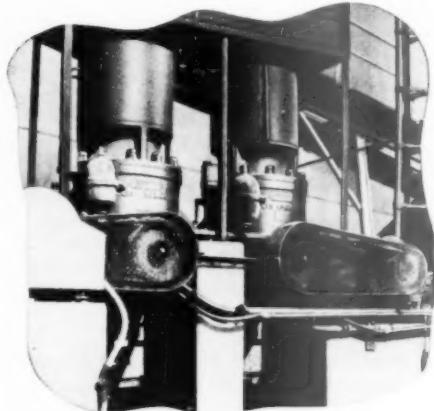
1. AUTOMATIC RESET

No "time out" to dig out your *Type R* crusher after stoppages! Automatic Reset hydraulically lowers the entire crushing head to pass tramp iron, etc. . . . then eases it back to original setting . . . without shock or costly interruptions.

2. "SPEED-SET" CONTROL

You get quick adjustment of product size with *Type R* crusher. With "Speed-Set" control you can adjust product size to exacting specifications instantly—without stopping crusher! Precision control with just the turn of a hand crank.

Speed Set is an Allis-Chalmers trademark



OTHER TYPE "R" FEATURES

In the *Type R* crusher you'll have all-steel construction, with top shell and spider cast integral. Recessed spider cap results in an even distribution of feed and permits buried crusher operation.

Shape of the crushing chamber is important, too. Allis-Chalmers has developed this crusher with a scientifically designed crushing chamber that gives you — by actual comparison — greater capacity and a more cubical product! It's built with an eye to easy maintenance. Self-tightening concave requires no zincing, is easy to remove. Replaceable parts are easy to install. Ask the A-C representative in your area about these and other important features of the *Type R* crusher, or send for Bulletin 07B6006D. Offices or distributors in principal cities in the U. S. and throughout the world.

ALLIS-CHALMERS, 975A SO. 70 ST.

MILWAUKEE, WIS.

ALLIS-CHALMERS



Jaw Crushers



Vibrating Screens



Mills



Kilns, Coolers and Dryers



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A 2550

. . . and Other Equipment for the Crushing, Cement and Mining Industries



Largest Selling... Lowest Costing
CHEVROLET ADVANCE-DESIGN TRUCKS
Lead Them All!



You'll discover a new kind of value when you drive and ride in these Advance-Design Chevrolet trucks. You'll find fleetness and flexibility, power and massive strength and long-lasting quality in every feature of body, frame, cab and chassis. Yet, you enjoy all these premiums *at lowest cost*, for Chevrolet trucks have **3-WAY THRIFT**—low-cost operation, low-cost upkeep and the *lowest list prices in the entire truck field!*

CHEVROLET MOTOR DIVISION, General Motors Corporation, DETROIT 2, MICHIGAN

The leader offers all these features

Chevrolet's 4-SPEED SYNCHRO-MESH TRANSMISSION offers quicker, quieter and easier operation in Series 3800 and heavier duty trucks. Faster shifting maintains speed and momentum on grades.

Chevrolet trucks have the famous CAB THAT "BREATHES"! Outside air is drawn in and used air forced out! Heated in cold weather.

Chevrolet's power-packed VALVE-IN - HEAD ENGINE provides improved durability and efficiency as well as the world's greatest economy for its size!

Chevrolet Advance-Design brings you the FLEXI-MOUNTED CAB, cushioned on rubber against road shocks, torsion and vibration.

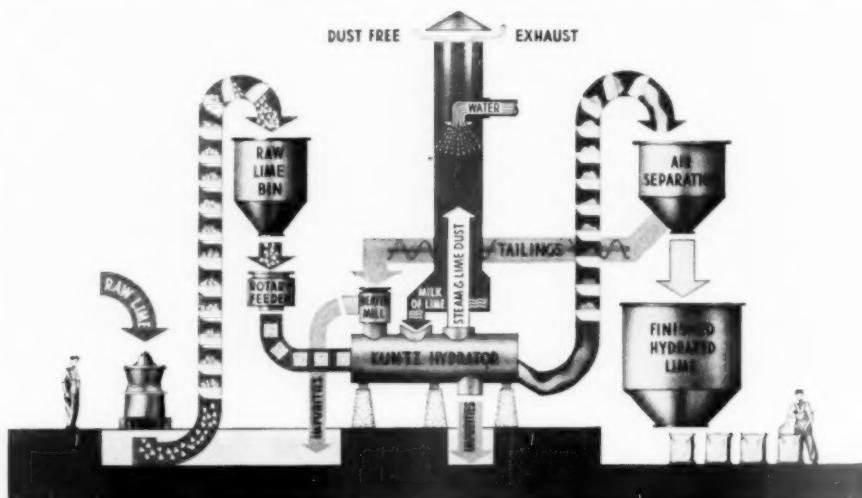
Chevrolet's exclusive SPLINED REAR AXLE HUB CONNECTION adds greater strength and durability to heavy-duty models.

Uniweld, All-Steel Cab Construction • Large, Durable, Fully-Adjustable Seat • All-Round Visibility with Rear-Corner Windows • Heavier Springs • Super-Strength Frames • Full-floating Hypoid Rear Axles on the 3600 Series and Heavier Duty Models • Specially Designed Brakes • Hydrovac Power Brakes on Series 5000 and 6000 Models • Standard Cab-to-Axle Length Dimensions • Multiple Color Options.

Heating and ventilating system and rear-corner windows with de luxe equipment optional at extra cost.

CHOOSE CHEVROLET TRUCKS FOR TRANSPORTATION UNLIMITED!

Reduce Waste . . . Increase Production with KUNTZ Continuous LIME HYDRATORS



Covered by patents and patent applications in U.S.A. and abroad.

NOW you can hydrate lime continuously . . . save time, money and manpower with Kuntz System Lime Hydrators. Sealed system design increases your lime production, keeps waste at a minimum and greatly improves the quality of your product!

Raw lime is fed automatically through a rotary feeder while water enters through the exhaust stack. As the illustration shows, the water traps rising fines and lime-laden vapor in the stack, and at the same time is preheated 100° by heat generated in the hydrator!

Impurities in the raw lime are removed in the hydrator, and tailings, after air separation, go to a beater mill where heavier impurities are rejected. Then the unhydrated lime is mixed with incoming lime and re-enters the hydrator.

Specify Kuntz system Lime Hydrators for increased production of highest quality hydrated lime at minimum cost per ton. Made only by Ellicott, they are available in four sizes, ranging in output from 1 to $7\frac{1}{2}$ tons per hour. Find out which one will meet your needs best! Write today for full information.

ELLIOTT MACHINE CORPORATION KUNTZ LIME AND HYDRATE PLANTS DIVISION

1653 Bush Street, Baltimore, Maryland, U. S. A.



CREATING *nothing* TO ASSURE
LONG LASTING SERVICE



Q
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QUAKER HOSE IS VACUUM "PRE-TESTED" FOR STRENGTH
OF WALLS... DURABILITY IN TOUGH SERVICE

If it has the Quaker trade-mark, it must be right. Each type of hose must meet rigid "pre-tests" before it is shipped for service in the rock products industry. Scientific pre-tests that subject hose to torture-tests more severe than will ever be encountered in the toughest service, are conducted right in Quaker plants.

One of these steps in "pre-testing" Quaker Hose is shown above. A vacuum test that puts Quaker Hose through the paces to provide rubber products for the rock products industry that are second to none in quality.

This is only one of the eighteen rigid tests that raw materials and finished products must pass before receiving the Quaker stamp of approval. Yes, "pre-testing" of Quaker belting, hose and packings provides quality, and long service... assures worthwhile dividends for your operations through less time outs for maintenance, higher efficiency, lower cost per hour.

PACKINGS THAT PRESERVE POWER



Quaker pump packings are pre-tested for size, shape and quality to assure perfect fit, long service, maximum power.

BELTS THAT BOOST POWER

Quaker's complete line of conveyor and transmission belting for every requirement in the rock products industry, is pre-tested and service-proved to provide sure-grip . . . slip less...save power.



QUAKER RUBBER CORPORATION

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Western Territory

QUAKER PACIFIC RUBBER CO. • San Francisco 10 • Los Angeles 21 • Seattle 4



REG. U. S. PAT. OFF.

*Make this Test
with ANY V-Belt*



You'll See at Once Why the

CONCAVE SIDE...

(U.S. Patent No. 1813698)

Saves You Money!



Bend any V-Belt and feel the sides change shape. The top of the belt, under tension, *narrows*. The body, under compression, *widens*. The sides of the belt bulge out.

The result, if the belt is built with *straight sides*, is a shape that does not fit the sheave groove—as shown in Figures 1 and 1A, below.

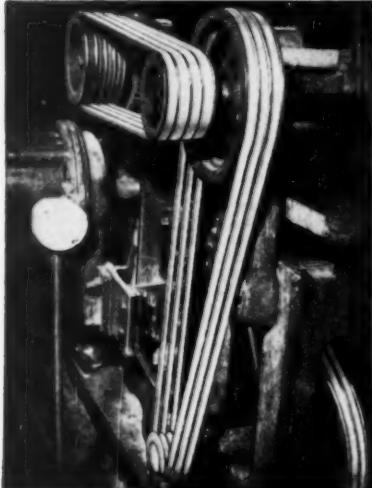


Straight-Sided V-Belt



How Straight-Sided V-Belt Bulges in Sheave-Groove

Clearly, the bulging of the sides will produce excessive wear along the *middle* of the sidewall as indicated by arrows.



Now, bend a V-belt with the *concave side*—the Gates Vulco Rope.

You get the same shape change but now the new shape exactly fits the sheave groove—as shown in Figures 2 and 2A.



Gates Vulco Rope
with Concave Side.



No Side Bulge.
Precise Fit in Sheave-Groove.

Results? (1) *Uniform* sidewall wear; *longer life!* (2) Full sidewall grip on the pulley. Carries heavier loads and *sudden load increases* without slippage; saves belts and also saves power!

The Concave Side is **MORE IMPORTANT NOW Than Ever Before**

Because the *sides* of a V-Belt are what actually *drive* the pulley, it is clear that any increased load on the belt means a heavier load that must be transmitted to the pulley *directly* through the belt's sidewalls.

Now that Gates **SPECIALIZED** Research has made available to you SUPER Vulco Ropes—carrying fully 40% higher horsepower ratings—the life-prolonging Concave Side is naturally more important in conserving belt life today than ever before.

THE GATES RUBBER COMPANY
DENVER, U.S.A.

The World's Largest Makers of V-Belts

494



GATES VULCO ROPE DRIVES
Engineering Office
and Jobber Stock
IN ALL INDUSTRIAL CENTERS

WHERE THE GOING IS *Really TOUGH!*

The PROBLEM — How to move a mountain of rock quickly and at low cost with a minimum of maintenance shutdowns.

The SOLUTION — A MARION 151-M, 6 cubic yard shovel, designed for continuous service in rock.

MARION
151-M



Send today for Bulletin 393 giving the complete story of the MARION 151-M.



MARION
POWER SHOVEL COMPANY
MARION, OHIO, U.S.A.

Offices and Warehouses in all Principal Cities



CONCRETE SAND for dam construction . . . or any heavy construction project . . . can be produced at the working site with a Dorr-equipped washing plant. Here are three typical examples . . . with capacities ranging from 50 to 500 tons per hour.

FLOWSCHEET #1—50 to 60 tons per hour

Simplicity itself—rod mill reduces the raw material . . . Dorr Classifier washes and separates finished sand from silt and water.

FLOWSCHEET #2—50 to 150 tons per hour

Rod mill reduces raw material . . . Dorr Bowl Classifier washes and separates finished sand from larger

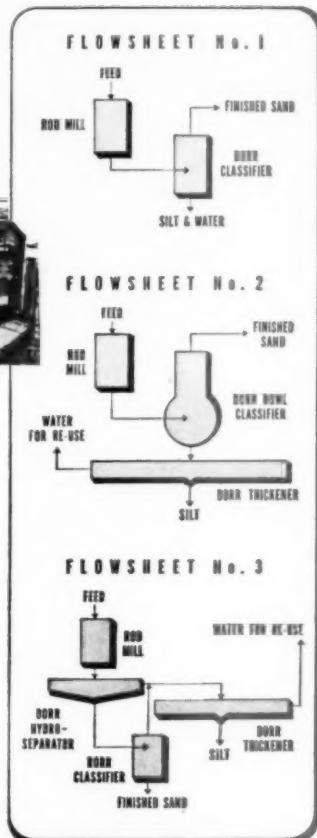
volume of silt and water. Dorr Thickener may be added to settle out silt and recover water for reuse.

FLOWSCHEET #3

150 to 500 tons per hour

Rod mill reduces raw material . . . Dorr Hydroseparater makes preliminary separation of sand and silt . . . Dorr Classifier makes final separation, delivering finished sand as rake product. Dorr Thickener recovers water for reuse from Classifier and Hydroseparater overflows.

A Dorr-equipped plant can produce any tonnage you need . . . can meet your specification for special sands at reasonable cost. A Dorr engineer will gladly discuss your requirements with you in terms of equipment and economics . . . at your request.



THE DORR COMPANY, ENGINEERS
370 Lexington Ave., New York 22, N. Y.

ATLANTA • TORONTO • CHICAGO
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*put this expert
on your payroll*

...at no extra cost!



Chase
Heavy Duty
Cotton Bags

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Topmill
Burlap Bags

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Paper Bags

Chase Sox-
ollin Open
Mesh Bags

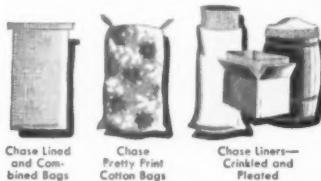
Chase Specialties:
Mailing Bags, Spi-
ral Tubing, Twines

Your Chase Salesman is a thoroughly trained bag specialist. He knows materials, design, construction, and the most modern packaging techniques.

And, he also knows how to best apply this information to your business . . . in terms of good looks, efficiency, and economy!

He is supported by a company with plants strategically located throughout America—to serve you quicker, better. His recommendations are backed by a reserve of experience that dates back to 1847.

Write today—he'll be glad to help provide a better container for your products.



Chase Lined
and Com-
bined Bags



Chase
Pretty Print
Cotton Bags



Chase Liners—
Crinkled and
Pleated



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OKLAHOMA CITY • PORTLAND, ORE. • REEDSVILLE, N.C. • HARLINGEN, TEXAS • CHAGRIN FALLS, O. • HUTCHINSON, KAN. • CROSSETT, ARK.



3 reasons why kiln operators prefer Thermalloy End Rings

1 No Built-up Brick Feed End

2 Quickly and Readily Adaptable

3 Reduce Operating Costs

Three reasons and every one a good one for specifying Thermalloy feed end rings. That's why more and more kiln operators are turning to Thermalloy.

When Thermalloy end rings are installed, the job is completed. No special built-up brick feed end is needed.

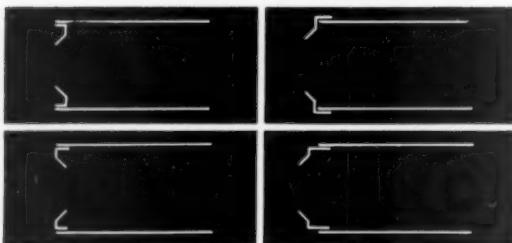
Installation is easy, too. Rings are cast in segments and are designed to fit the wide variations in kiln end requirements. The drawings on this page show how Thermalloy end rings can be adapted to your specific kiln.

Thermalloy feed ends can eliminate your kiln shell distortion without reducing the effective operating length of your kiln.

And once installed, you can expect reduced replacement costs with Thermalloy end rings. Thermalloy was developed specifically to take heavy loads and rough usage. It resists the corrosive gases, excessive heat and abrasion that constantly attack kiln operating equipment.

Before you place another order for kiln end rings, it will pay you to call Electro-Alloys. Let one of our engineers show you how Thermalloy can reduce your operating costs.

**How Thermalloy End Rings can be adapted
to meet present kiln requirements**



**AMERICAN
Brake Shoe
COMPANY**

**ELECTRO-ALLOYS DIVISION
ELYRIA, OHIO**



Introducing Your Union Multiwall Specialist

(His job is to make your packaging dollar go further)

YOUR UNION Multiwall Specialist knows how to tailor a package to meet the specific needs of your product and method of distribution. He has helped many firms reduce their packaging costs. He may be able to do the same for you.

Union Multiwall Bags are used in plants making more than 300 different commodities. They're speeding up packaging, cutting labor and shipping costs, giving added protection to the product — yes, and making customers happier.

Even if you're now using Multiwall Bags the Union Multiwall representative who calls on you can give you new ideas on packaging methods that may save you money. For he is backed by the specialized packaging knowledge of America's largest maker of paper bags—with its own forests, the largest completely integrated Kraft pulp-to-bag plant in the world, and skilled engineering and design experts.

Let him show you how Union resources and packaging experience can help you.



UNION Multiwall Bags

UNION BAG & PAPER CORPORATION

233 BROADWAY, NEW YORK 7, NEW YORK

PLYMOUTH LOCOMOTIVE Saves 40 Man-Hours Per Week



Since it first replaced the obsolete motive power previously used by the Rockford Brick & Tile Company, Rockford, Iowa, over four years ago, this 6-ton gasoline powered Plymouth Locomotive has saved an average of 40 man hours per week.

Average fuel consumption of this "little

giant" is one gallon per hour. It operates on a 24-inch gauge track.

If you are interested in economical, dependable haulage that will lower your production costs and increase output you'll be interested in the Plymouth story, available without obligation.

Write to Plymouth Locomotive Works,
Dept. A-5, Plymouth, Ohio.

PLYMOUTH LOCOMOTIVES

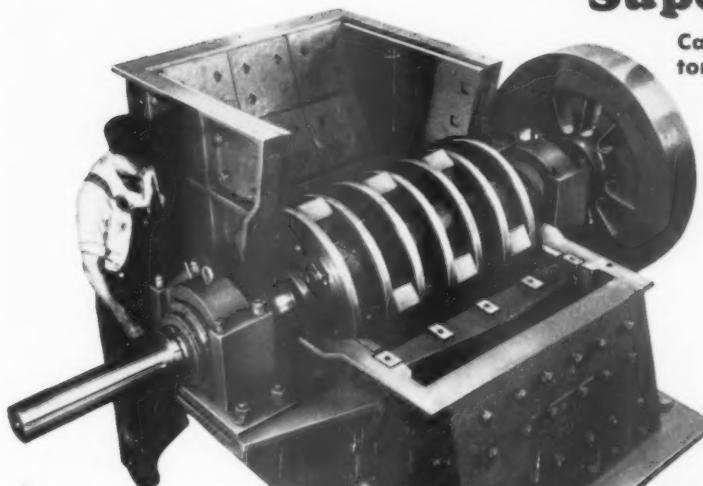
GASOLINE, DIESEL MECHANICAL AND DIESEL ELECTRIC

PLYMOUTH LOCOMOTIVE WORKS • Division of The Fafe-Root-Heath Co., Plymouth, Ohio, U.S.A.

"POWER SHOVEL LOADED ROCK TO AGSTONE IN ONE OPERATION"

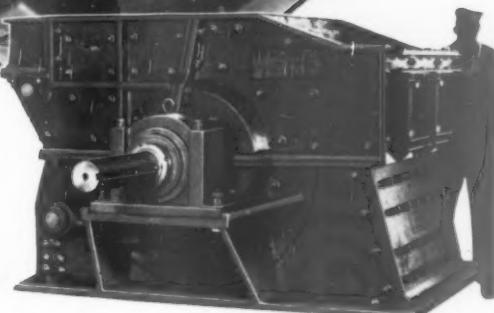
WITH THE WILLIAMS
"Super-Slugger"

Capacities from 30 to 150
tons hourly of Agstone



Superior in . . .

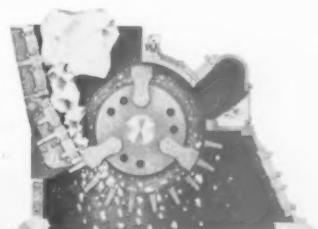
- **Size**
- **Output**
- **Construction**



Williams has pioneered the idea of one large hammer mill reducing quarry run stone to small sizes in one operation, and the "Super-Slugger" now represents the accumulated experience gained in many years of such work. The "Super-Slugger" is an extra heavy duty crusher, designed for operators requiring high tonnage output, great strength and the capacity to reduce power shovel stone to desired sizes in one operation.

Williams also manufacture the now famous "Slugger" and "NF" Crushers and pulverizers. The "Slugger" will take one

man stone and reduce to $1\frac{1}{4}$ ", $\frac{3}{4}$ " or Agstone in one operation, while the "NF" is supreme as a regrinder, taking 4" and smaller stone. Both are built in various standard sizes, affording a type and size for all operators. Quotations gladly made upon request.



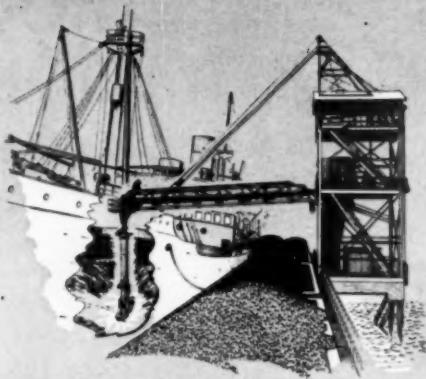
Sectional View above shows operation of the Williams Hammer Principle of Crushing.



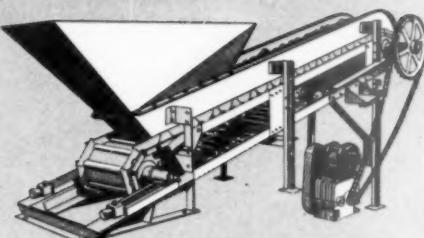
WT1422mC
WILLIAMS
PATENT CRUSHERS GRINDERS SHREDDERS

OLDEST AND LARGEST BUILDERS OF HAMMERMILLS IN THE WORLD

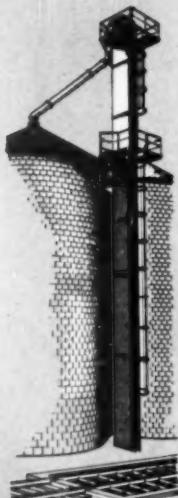
The Williams Patent Crusher & Pulverizer Co.
800 St. Louis Ave., St. Louis 6, Mo.



S-A centrifugal action
boat trimmer for load-
ing and trimming bulk
materials into holds
of ships.



S-A pan conveyor for
feeding bulk materials.



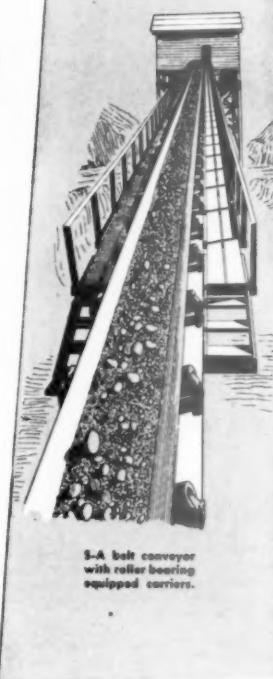
S-A bucket elevator
storing bulk materials
in two silos.

Stephens-Adamson Engineers
are Qualified to
SURVEY Your SYSTEM
for Handling Bulk Materials

We offer a check-up by our well-qualified staff of specialists in handling bulk materials — from lumps to powder.

The reasons for such a survey are *improvement* of product, and saving in handling cost. The recommendations you receive will be based on 50 years of installing successful conveying systems. Since we make *every* type of conveyor, we can propose without prejudice the best type for your job.

Write us to check whether your present conveyor system is right, or could be materially improved.

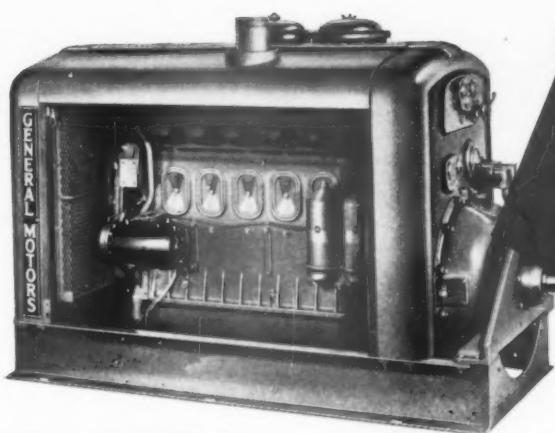


S-A belt conveyor
with roller bearing
equipped carriers.

S T E P H E N S - A D A M S O N
7 RIDGEWAY AVENUE, AURORA, ILLINOIS

LOS ANGELES, CALIF. • BELLEVILLE, ONT.

*Designers and Manufacturers of All Types of
BULK MATERIAL HANDLING EQUIPMENT*



**In Combination
Torque Converter
and Fluid Coupling
Integral with the Engine**

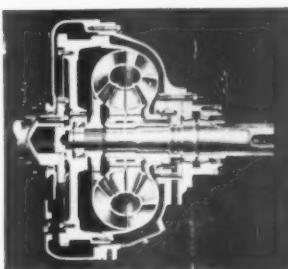
The NEW General Motors DIESEL ENGINE-TORQUE CONVERTER UNIT

HERE is a complete, integrated Diesel engine-torque converter unit that combines the inherent efficiency of the GM 2-cycle Diesel engine with the features and advantages of both torque converter and fluid coupling. It provides torque multiplication up to 4 to 1 for starting variable heavy loads. It also provides highly efficient transmission of power during light load periods by automatically shifting to fluid coupling in the upper speed range.

A smooth, uninterrupted flow of power, delivered through a liquid, prevents engine stalling under any load and protects both engine and driven machinery from sudden shocks.

One Manufacturer—One Responsibility

Up to now most engines and hydraulic drives have been separate units. The result—compromise designs and divided responsibility. Now General Motors



In the new GM Torque Converter, oil does the work. Automatic transition from torque multiplication of 4:1 at stall to 1:1 in upper speed range.

General Motors 71 Diesels equipped with the new GM Torque Converter take up no more space or weight than the same engines with conventional friction clutch and power take-off. Available in 3-, 4-, and 6-cylinder single engine units. Twin 4 and Twin 6 models having engine ratings from 75 to 300 H.P.

offers a new torque converter specifically designed and manufactured as an integral part of the General Motors Series 71 Diesel engine. It is a self-contained unit built by one manufacturer providing a long needed saving in space and weight as well as certain desirable operating characteristics not available before.

This new power unit will get the most work done in the least time because the engine operates in its most efficient speed range at all times—delivering maximum engine horsepower regardless of the speed of the load. Maximum torque to start heavy loads PLUS maximum horsepower to keep the load moving.

Everyone with a hard job to do in the oil fields, in construction, in mining or in logging should have all the facts about this compact, flexible GM Diesel Engine Torque Converter unit. Write today for a complete description.

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES...Up to 200 H.P.

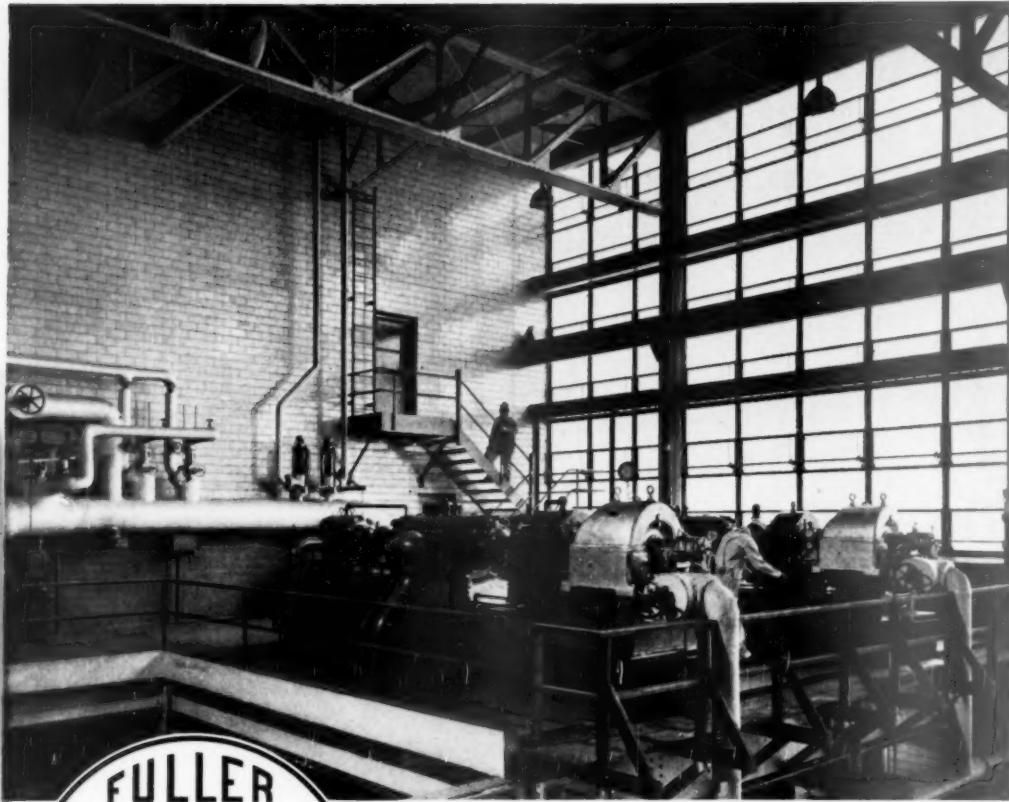
DETROIT 26, MICHIGAN

multiple units...Up to 800 H.P.

GENERAL MOTORS

DIESEL BRAVING WITHOUT THE BULK





PHOTO—HEDRICH-BLESSING



in
SHERWIN-WILLIAMS
New Boiler House

Two Fuller Rotary Two-stage Compressors are installed in the new boiler house of The Sherwin-Williams Co., Chicago, shown above.

These compressors furnish air for both factory and power-house service. Each has a capacity of 1592 c.f.m., free-air, at 120-lb. pressure, driven by 350 hp. turbine, equipped with speed reducer, to operate at 575 r.p.m.

Fuller Rotaries are ideal units for any industrial plant. They are built in single and two-stage for capacities to 3300 c.f.m., actual free-air delivery, 125-lb. pressure; vacuums to 29.90-in. (referred to 30-in. barometer).

Bulletin C-5 illustrates and describes these machines. We will gladly send you a copy.

A LIFETIME OF NEW MACHINE EFFICIENCY

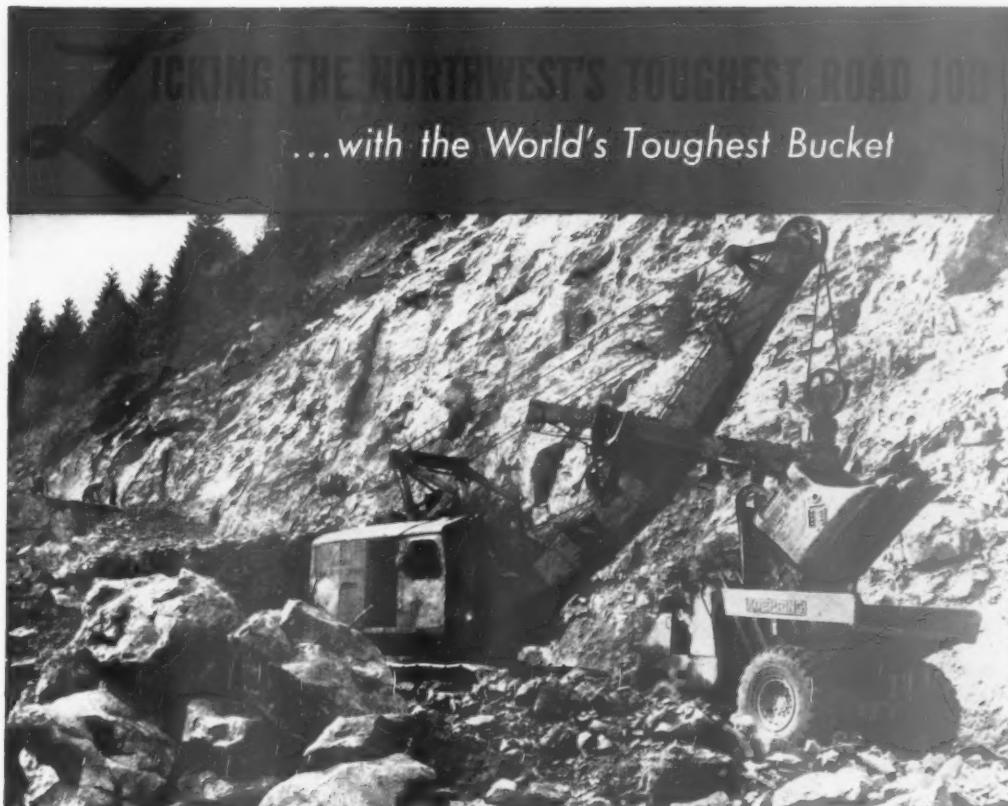
FULLER COMPANY, CATASAUQUA, PA.

Chicago 3 - 120 So. LaSalle St.

San Francisco 4 - 420 Chancery Bldg.



C-178



ESCO all-cast dipper bucket with box-type points and adapters working on North Santiam highway in Oregon. Contractor: Kuckenberg Construction Company, Portland, Oregon

In the Pacific Northwest, scene of the nation's most rugged road building jobs, the North Santiam highway is known as the toughest of them all. Roadway was carved out of the forest. Three million yards of muck and basalt rock had to be moved from 9.8 miles of road. Drilling and shooting averaged 60 cents a yard, and excavation sometimes ran as high as \$2.50 a yard.

ESCO all-cast manganese dipper buckets are one of the tools that licked the job. For over a year four of these buckets stood up under this beating with only minor maintenance — and they are ready for still more tough going on the next job.

Contractors the world over specify ESCO all-cast dippers for their toughest jobs. Here is why —

Last Longer on the Job

Made of shock-resisting manganese steel that surface hardens and gets tougher with use.

Lighter Weight... Bigger Payloads

Hollow back beam reduces weight while actually increasing strength. Manganese steel eliminates necessity of casting wearing parts excessively heavy to allow for wear. Shovel power moves payload instead of dead weight.

Faster Digging

Clean cutting front with integrally cast tooth holders reduces digging resistance. Flaring position of teeth gives full bite. Tapered box prevents clogging, permits quick complete discharge.

Sizes from $\frac{3}{8}$ to 6 yards... Ask for Detailed Data

Details of construction of ESCO manganese dipper buckets are contained in catalog number 114-C. Your nearest ESCO representative will gladly give you a copy; or fill in and mail the coupon. Electric Steel Foundry, 2177 N.W. 25th Avenue, Portland 10, Oregon; 726 Porter Street, Danville, Illinois. Offices in Eugene, Oregon; Chicago; Honolulu; Houston; Los Angeles; New York; San Francisco; Seattle and Spokane. In Canada, ESCO Limited, Vancouver, B.C.

esco

DIPPER AND DRAGLINE BUCKETS

ELECTRIC STEEL FOUNDRY

2177 N.W. 25th Ave., Portland 14, Oregon

Please send catalog 114-C featuring ESCO all-cast manganese dipper buckets to:

Name _____

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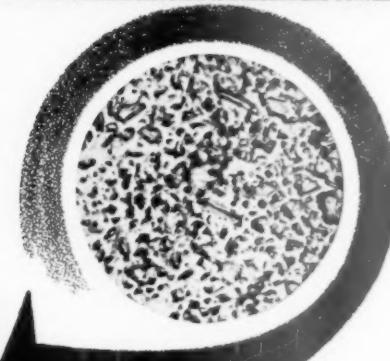
RAYMOND HIGH SIDE ROLLER MILL

You can DRY as you GRIND

Why not double your production economies by combining your drying and grinding operations? Scores of plants are able to accomplish this by the use of Raymond Roller Mills equipped with the Flash Drying System.

The complete job can be handled in a single unit of equipment by continuous, automatic operation . . . drying, pulverizing, classifying and conveying the product to storage.

This means the elimination of separate dryers, conveyors and auxiliary equipment . . . a shorter



Over Maximum Fineness

Equipped with double whizzer separator for instant adjustment in fineness control from 60% minus 100-mesh up to practically all passing 325 or 400-mesh. Changing speed of whizzer gives desired classification of finished product.

COMBUSTION ENGINEERING - SUPERHEATER, INC.

Sales Offices in Principal Cities

Canadian Office: Montreal

with Raymond Mills

time of processing . . . and no re-handling of materials.

Consider the savings you could show over present methods . . . especially in handling products that carry surface moisture, such as limestone, marble chips, gypsum, clays, kaolin and other non-metallics.

Get in touch with Raymond engineers now . . . and let them help you select the proper mill for your needs.



For Medium Fineness

Raymond Roller Mills are available in a wide range of sizes, including Midget Roller Mills for small capacity requirements, and the Super Roller Mills for producing 15, 25 or up to 40 tons per hour of finished product.

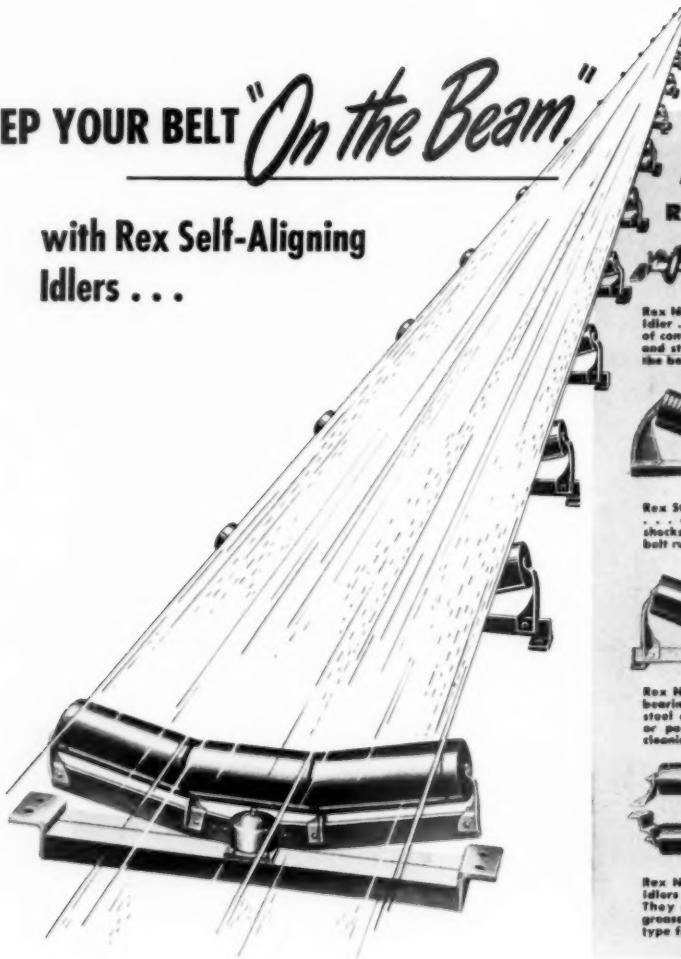
RAYMOND PULVERIZER DIVISION
1307 NORTH BRANCH STREET

CHICAGO 22, ILLINOIS



KEEP YOUR BELT "On the Beam."

with Rex Self-Aligning
Idlers . . .



A FEW OF THE REX IDLER LINE:

Rex No. 55 Rubber-Covered Spiral Return
Idler . . . creates an ever-changing point
of contact to keep moisture, ice, abrasive
and sticky materials from building up on
the belt.



Rex Style No. 35 Impact Cushioning Idler
. . . dual purpose rubber rolls cushion
shocks at loading points . . . minimize
belt rupture and lacerations.



Rex No. 32 Troughing Idler . . . is roller-
bearing equipped, can be furnished with
steel or gray iron rolls. Has no shelves
or pockets to catch dust . . . is self-
cleaning.



Rex No. T-6 Flat Belt and No. T-1 Return
Idlers . . . are dead shaft type idlers.
They are equipped for high pressure
grease lubrication . . . have hydraulic
type fittings.

- Off-center loading, side-wind drifting, warped frames, or uneven belt stretch won't bother your conveyor belts if you install a few Rex Self-Aligning Troughing Idlers.

These dependable idlers assure automatic belt alignment without the need for side-guide idlers that impose excessive belt edge wear. The idler roll assembly is so mounted on a roller-bearing turntable that any weaving of the belt away from the center line will swing the idler into an angular position and thereby automatically guide the belt back to the conveyor center

line. Damage to belts from running off is eliminated.

The Rex Self-Aligning Idler design is completely flexible. The idlers are made to fit into any belt conveyor frame, and with any make of idler . . . important features that simplify installation and maintenance. With Rex, the belt can be run in either direction.

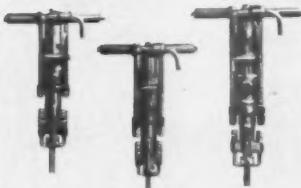
A Rex Idler Specialist will be glad to give you all the facts on the idlers that keep your belts "on the beam." Or, if you prefer, write for your copy of Bulletin No. 48-41. Chain Belt Company, 1649 West Bruce Street, Milwaukee 4, Wis.





No matter where you send a Gardner-Denver Portable Compressor, you can be sure of a steady, uninterrupted air supply. For regardless of climate or altitude, the complete water jacketing of all cylinders "weather-conditions" them against over-heating—and from cold, unlubricated starts in sub-zero weather. For complete information, write Gardner-Denver Company, Quincy, Ill.

...FOR THE RIGHT AIR TOOLS



There's a Gardner-Denver Sinker that's "correct" in size and power for every type of ground. Shown here are the three most popular models: the high-speed S45 for secondary drilling or medium rock—the S55, most popular 55-pound sinker on the market—the S73, 67 pounds of speed and power for deep holes or the hardest formations.



Powerful Gardner-Denver 887 Paving Breaker has exclusive throttle safety latch—can be easily moved around the job without shutting off the air. Easily converted to a sheeting driver.

The feed of the new Gardner-Denver UHM99 Wagon Drill is powered by a five-cylinder radial air motor. Designed for speedy, six-foot steel changes; carries a 3½ in. or 4 in. bore derrick drill. Your operator will like the ease of control.



The Gardner-Denver T23 Backfill Tamper is balanced for easy "walking" over the fill—has valve and exhaust that won't "freeze" in cold, damp weather—contains integral oil reservoir that assures complete lubrication.



Gardner-Denver Model 28 Clay Digger makes digging easy in clay or hardpan—can also be equipped with axe blade for trimming or cutting timber, or with mail point or chisel for light demolition work.



GARDNER-DENVER SINCE 1859



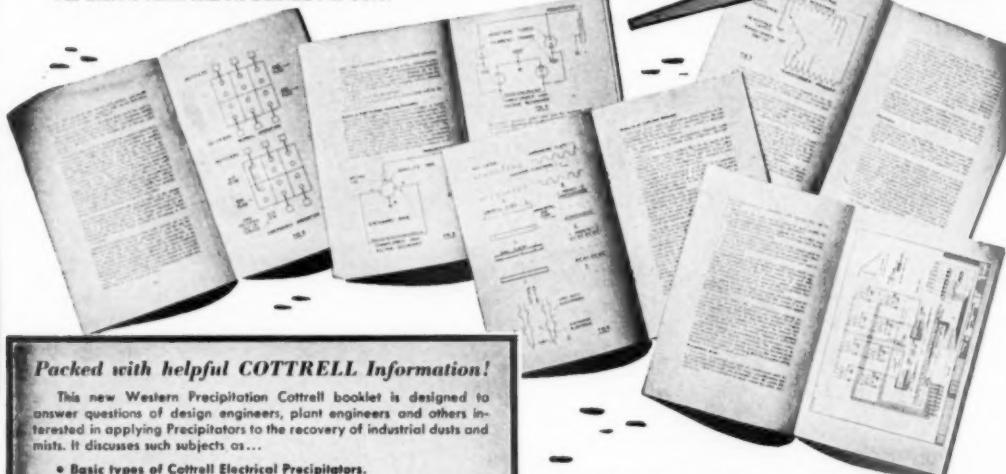
From Western Precipitation—the organization that pioneered the commercial application of Cottrell Precipitation...

IF YOU ARE ENGAGED in any phase of industry where the recovery of dusts, fumes, fly ash, mists, fogs or other suspensions from gases is a problem, you will find this new booklet on the COTTRELL Electrical Precipitator helpful and informative.

Western Precipitation pioneered and installed the first commercial application of the well-known COTTRELL Electric Precipitator—Dr. Cottrell, the inventor, being a member of the company. And for more than 38 years Western Precipitation has consistently led in developing new COTTRELL advancements and techniques for recovering suspensions from gases, both wet and dry.

This new 28 page booklet summarizes many of the basic facts you should know about modern COTTRELL Precipitators—the various types available, how they operate, principal types of electrode systems and rectifiers, shell constructions, etc. As long as the supply lasts, a free copy will be sent you on request to our nearest office. Ask for Bulletin No. C103.

28 PAGES
of helpful facts to
know about
COTTRELL
ELECTRICAL
PRECIPITATORS



Packed with helpful COTTRELL Information!

This new Western Precipitation Cottrell booklet is designed to answer questions of design engineers, plant engineers and others interested in applying Precipitators to the recovery of industrial dusts and mists. It discusses such subjects as...

- Basic types of Cottrell Electrical Precipitators.
- Principal parts of a Cottrell Precipitator.
- Mechanical and Electronic Rectifiers.
- Various types of Collecting Electrodes (red curtains, corrugated plates, dual plates, pocket electrodes, etc.).
- Removal of Collected Material.
- Factors in Shell Construction (steel, concrete, brick, etc.).
- Operating Efficiencies and the Effect of Various Factors on Performance.

...and many other basic Cottrell facts. Write for your free copy of Bulletin C103 today while supplies are adequate!

Western Precipitation is not affiliated with any other company in the field of electrical precipitation except its wholly owned subsidiaries, International Precipitation Corporation and the Precipitation Company of Canada, Ltd. Whether you are now contemplating the installation of a Cottrell Electrical Precipitator, or may be interested in such an installation at a future date, we can and will serve you in any part of the United States or other countries.

NOW SELLING...



...in all parts of the U.S.A. and foreign countries.

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ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR
COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

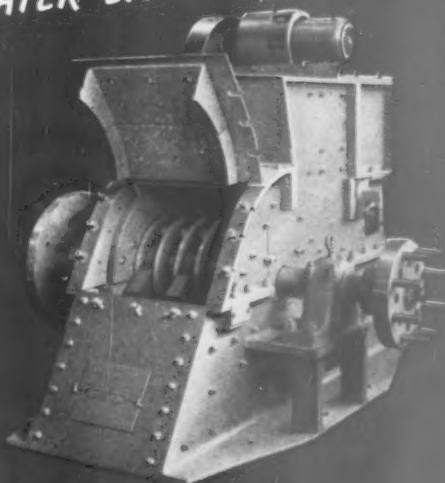
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MUD HOG CRUSHER

WET -- STICKY MATERIAL
(LIKE CLAY, SHALE, ORES, CEMENT ROCK, ETC.)

that plugs or builds up in other types
of crushers.

*CRUSHES with
GREATER EFFICIENCY*



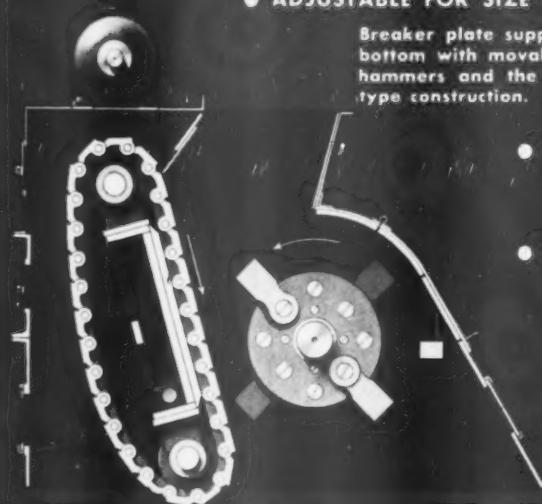
- CONVEYOR-TYPE BREAKER PLATE

(see drawing)

Actually conveys stickiest material into path of heavy steel hammers, which crushes and sweeps breaker plate clean for next revolution . . . gear driven with separate motor . . . rugged construction.

- ADJUSTABLE FOR SIZE OF PRODUCT

Breaker plate supported at top by fixed drive shaft . . . at bottom with movable shaft for adjusting clearance between hammers and the crushing surface backed by heavy anvil type construction.



- CAPACITY — 40 to 350 tons per hour
depending upon product desired
and crusher size.

- STREAMLINED — crusher frames of
heavy plate steel . . . back frame flared
for large discharge area . . . renewable
liners throughout.

Larger sizes of the MUD HOG Crusher (reversible type) have two continuous-moving breaker plates . . . each adjustable for a different size of product.

Bulletin No. 811

JEFFREY

ESTABLISHED 1877

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You don't have to look any farther than Bucyrus-Erie to find a shovel that meets your output needs with dependable, long-life service. That's because Bucyrus-Eries are quality-built for tough digging.

The 5-cu. yd. 120-B, for example, is one of the Bucyrus-Erie quarry and mine shovels that has proved its worth in many corners of the world. It has plenty of speed, power and strength to boost output... sturdy construction, easy maintenance and smooth op-

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59L48

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TEXROPE



"No Upkeep Now"

BELT SLIP ELIMINATED,
BEARING DAMAGE
STOPPED, POWER WASTE
ENDED WHEN **TEXROPE**
V-BELT DRIVE
REPLACES FLAT BELT.

CHIEF PLANT ENGINEER in this midwest plant says, "The old flat belt on this blower drive was twelve inches wide on twenty foot centers. Not only was it heavy but it also absorbed a lot of power.

"Besides that, dust made the belt slip constantly. We had to keep the belt so tight that it ruined bearings. And slipping would burn the belt. Maintenance on our old flat belt drive cost us hundreds of dollars every year.

"Four years ago an Allis-Chalmers representative recommended this *Texrope* drive. It doesn't slip at all, doesn't hurt the bearings and we haven't spent a cent on it. I wish we had changed to a *Texrope* drive years sooner."

Money-saving performance like this is one of the reasons why more *Texrope* in-

dustrial V-belt drives have been installed since 1926 — when Allis-Chalmers originated the multiple V-belt drive — than any other kind.

The *Texrope* line gives you practically everything you need for any V-belt drive . . . V-belts, standard and *Vari-Pitch* sheaves and speed changers . . . all from one reliable source. You can engineer 90% of all V-belt drives yourself with the help of the *Texrope* Pre-engineered Drive Manual. See your A-C Authorized Dealer or District Office or write for Bulletin 20B6956. Also in Sweet's.

Texrope Super-7 V-belts result from the cooperative research of Allis-Chalmers and B. F. Goodrich; and are sold only by A-C dealers and offices. *Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks.

Sold . . .
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by Allis-Chalmers Authorized Dealers,
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Offices throughout the country.



MOTORS — $\frac{1}{2}$ to
25,000 HP and up.
Matching Allis-Chalmers
Motors Control.

TEXROPE — Belts in
all sizes and sections,
standard and *Vari-Pitch*
sheaves, speed
changers.



PUMPS — Integral
motor and coupled
types. Sizes and rat-
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ALLIS-CHALMERS, 975A SO. 70 ST.
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ALLIS-CHALMERS

Proved at 139 installations



Automatic -POINT CONTROL

of the B&W
Direct-Firing System

UNIFORMLY maintains proper coal-air ratio and volume for most efficient combustion at all loads.

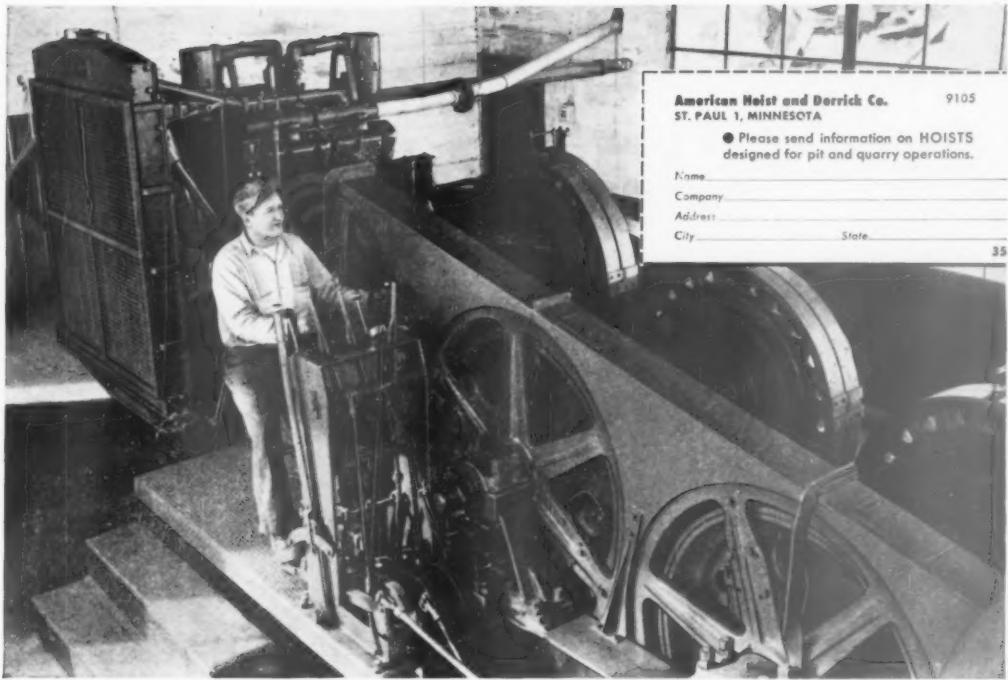
AUTOMATICALLY and immediately responds to variation in size, grindability and moisture content of coal, and in kiln requirements.



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FOR CEMENT PLANTS—Heat and Abrasion Resistant Alloy Castings...Stationary Boilers and Component Equipment...Waste-Heat Boilers...Fuel Burning Equipment...Pulverized-Coal Direct-Firing System...Pulverizers for Grinding Rock Products and Ores...Refractories...Seamless & Welded Tubes for All Pressure and Mechanical Applications.



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● Please send information on HOISTS
designed for pit and quarry operations.

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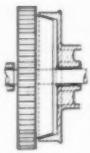
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35

The hoist that delivers in the clutch



WHAT QUARRY MEN SHOULD KNOW ABOUT CLUTCHES

CONE TYPE clutches, operated by lateral pressure, create side thrust on frame of the hoist. Must be held under pressure when engaged, and need spring release mechanism. Adjustment and maintenance relatively difficult. Heat is created internally, one is not readily dissipated.

CONTRACTING BAND clutches on AMERICAN hoists are engaged by external band action. Clutch is self-energizing. One set screw, easily reached, gives instant adjustment. All parts needing maintenance are accessible. Bands reversible for extra wear. Fins quickly dissipate created heat.



When the chips are down, and you have to call on men and machines for "impossible" performance . . . it's a pleasure to own an AMERICAN hoist. In that kind of a situation, you'll notice some amazing differences in the way a hoist can behave. First—you'll notice extra production without a sign of strain. Second—an effortless, precise operation that keeps the operator fresh and rested. Third—your AMERICAN hoist stays cool and quiet while another may be smoking hot, noisy and seeming to labor in every part.

The reasons? There are many . . . but important as any is the AMERICAN hoist *friction clutch*. It's an external, contracting band mechanism. Wonderfully smooth, instantly responsive . . . and always tuned to "concert pitch", because repair and maintenance are simple, quick and easy.

Want to find out how such a hoist fits *your* business? Mail coupon today, for literature telling the story.

American Hoist and DERRICK COMPANY

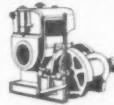
St. Paul 1, Minnesota

Plant No. 2: So. Kearny, N. J. • Sales Offices: NEW YORK, PITTSBURGH, CHICAGO

THE WIDE LINE OF AMERICAN HOISTS OFFERS THE RIGHT SIZE, THE RIGHT TYPE, THE RIGHT POWER, FOR ANY JOB



Utility Hoist
500 lbs. S.L.P.



Single Drum Hoist
2,500 lbs. S.L.P.



Double Drum Hoist
7,500 lbs. S.L.P.



Three Drum Hoist
10,000 lbs. S.L.P.

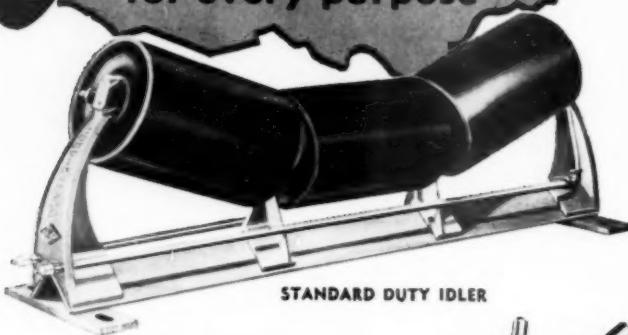


Four Drum Steam Hoist
25,000 lbs. S.L.P.



Three Drum Hoist
40,000 lbs. S.L.P.

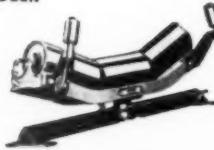
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STANDARD DUTY IDLER



RUBBER DISC IMPACT IDLER



SELF-ALIGNING
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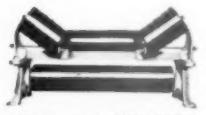
FLAT BELT IDLER



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Specify

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and be sure of receiving the correct Idlers for your particular conveyor. No matter what the material handled or the problems involved, there's a Continental Idler that will do the job. This is only one example of Continental's complete service in the Materials Handling Field.

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ENGINEERS



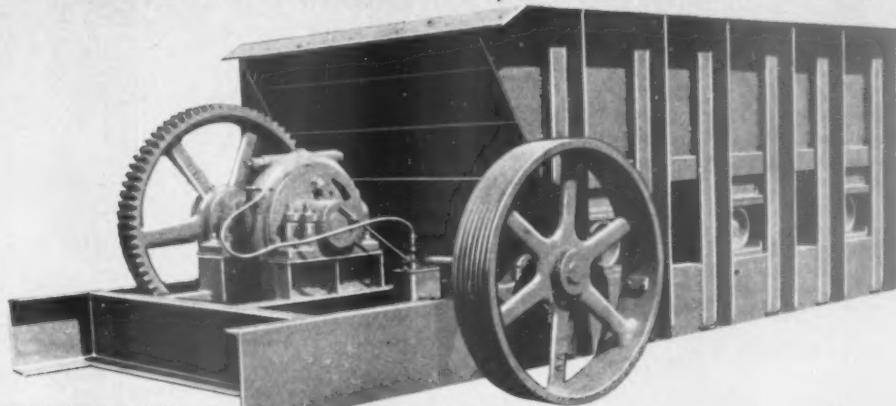
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For Economy in handling TONNAGE ...

from the size of SAND → shovel loaded ROCK



- Single and Double Roll Crushers (Primary and Secondary)
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- Dryers of Revolving Type
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- Feeders
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- Ore Jigs
- Screens
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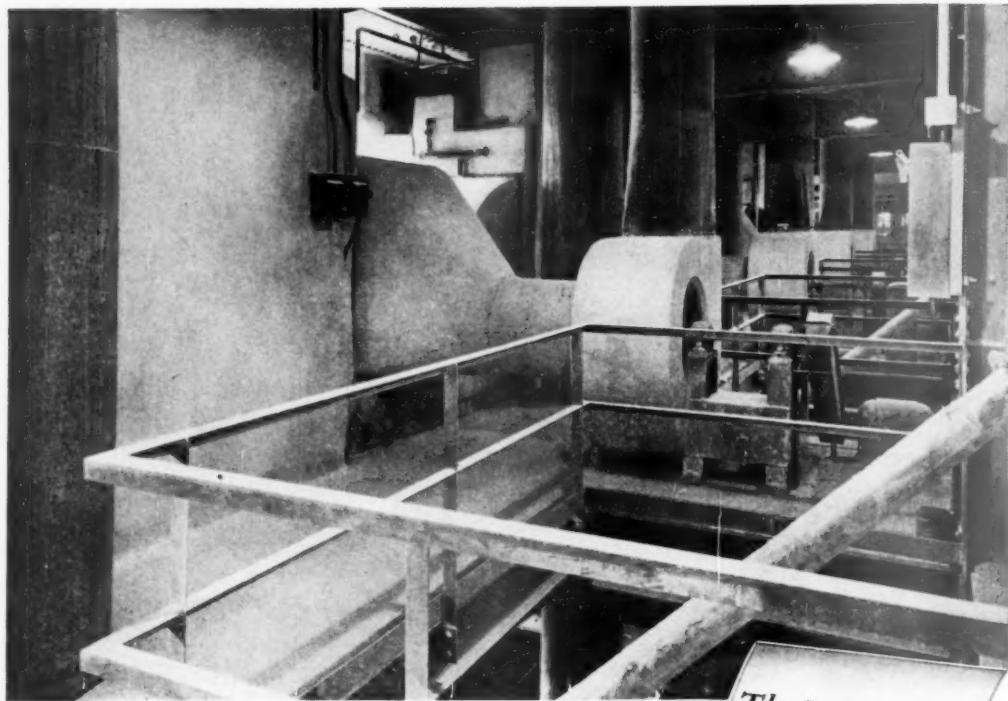
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RECIPROCATING
PLATE FEEDERS**

Heavy duty McLanahan Reciprocating Plate Feeders are quickly adaptable to the producing capacity of any machine. These self-contained feeders automatically control the flow of all kinds of materials, from sand to shovel rock. Special design protects the bottom plate and pan, so the hopper may be completely filled without danger. Although rugged in construction, they require surprisingly little power. Through increased production and lowered overhead, McLanahan Reciprocating Plate Feeders easily pay for themselves in a short time. Write for descriptive bulletin.

**Headquarters for Pit, Mine and Quarry Modernization
MCLANAHAN and STONE Corp.**

HOLLIDAYSBURG, PA.

Since 1835



KOPPERS-ELEX PRECIPITATOR RECOVERS MORE GYPSUM THAN GUARANTEED!

*The Story Behind
KOPPERS-ELEX
Performance
GUARANTEE*

A LARGE gypsum plant, faced with the problem of controlling the disadvantage of gypsum dust, chose a Koppers-Elex Precipitator. Outstanding performance in excess of guaranteed results was obtained.

Under standard (A.S.M.E.) tests conducted during actual operating conditions, the precipitators on four calcining kettles limited re-

siduals to .07 grain per cubic foot of gas—and the overall efficiency on the precipitators installed on the rock drier averaged 99.30%.

This performance, which exceeds the guarantee, is typical of Koppers-Elex operation. Correct design and precision engineering, coupled with the experience gained from over 1000 successful installations, give superior results in the

recovery or removal of materials from gases. For the same superior performance in your plant, specify Koppers-Elex—designed, engineered, built, installed and guaranteed by Koppers...with 111 years of reputation-building integrity behind it. Koppers Co., Inc., Koppers-Elex Precipitator Department, 244 Scott St., Baltimore 3, Maryland.

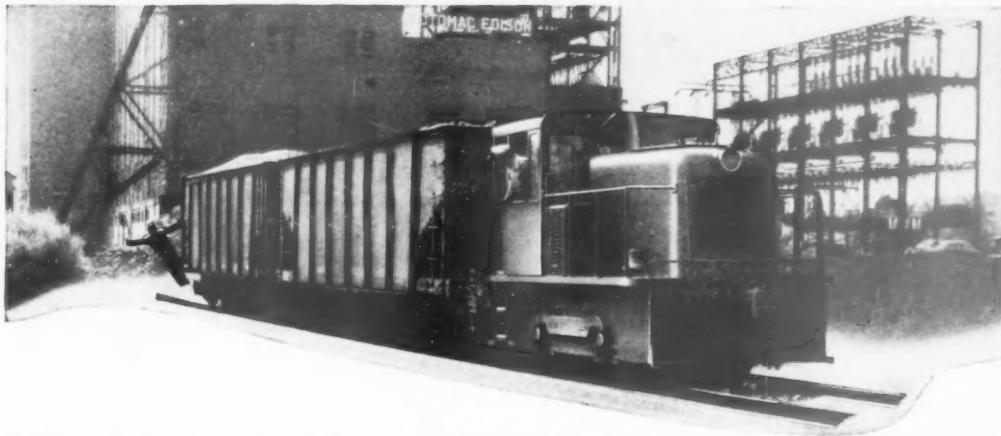
1st with Industrial Gas
Cleaning Equipment

Koppers-Elex



ELECTROSTATIC PRECIPITATOR

HOW MUCH WILL YOU SAVE?



G-E locomotive at eastern plant saves \$4288 in one year ... will pay for itself in less than four years.

"Our G-E 25-ton diesel-electric switcher is saving us \$4288 a year; and, it's doing 30 per cent more work in the same amount of time, than the 30-ton steam locomotive it replaced," says the power plant superintendent* of an eastern utility.

Since it arrived on the job in March 1947, the snappy G-E locomotive has had an availability of 99.2 per cent. Working a six-day week, $7\frac{1}{2}$ hours a day, it hauls twelve 50-ton cars of coal at one time.

30.0 Per-cent Investment Return

The \$4288 yearly saving is about 30 per cent of the original investment, thus the economical 25-tonner will pay for itself in less than four years. Here are *Name furnished on request.

the savings in detail:

Diesel-electric (25-ton)	Steam (30-ton)
\$397.80	Fuel
121.70	Lube Oil
41.67	Maintenance
\$561.17	Total
	\$3650.00
	1200.00
	\$4850.00

Your Savings Estimated

Over 1500 G-E switchers are saving thousands of dollars in many types of industries. Have your nearest G-E representative show you how diesel-electrics can cut costs in your own plant. Our transportation specialists will survey your switching requirements — estimate your savings in advance. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

DO YOU HAVE THESE FACTS ON LOW-COST SWITCHING?



• Operating Results

• Graphs

• Tables

FREE BULLETIN

Section AL-4909

General Electric Company
Schenectady 5, N. Y.

Without obligation send me your fact-filled locomotive bulletin "Switch to Diesel-electrics and Save."

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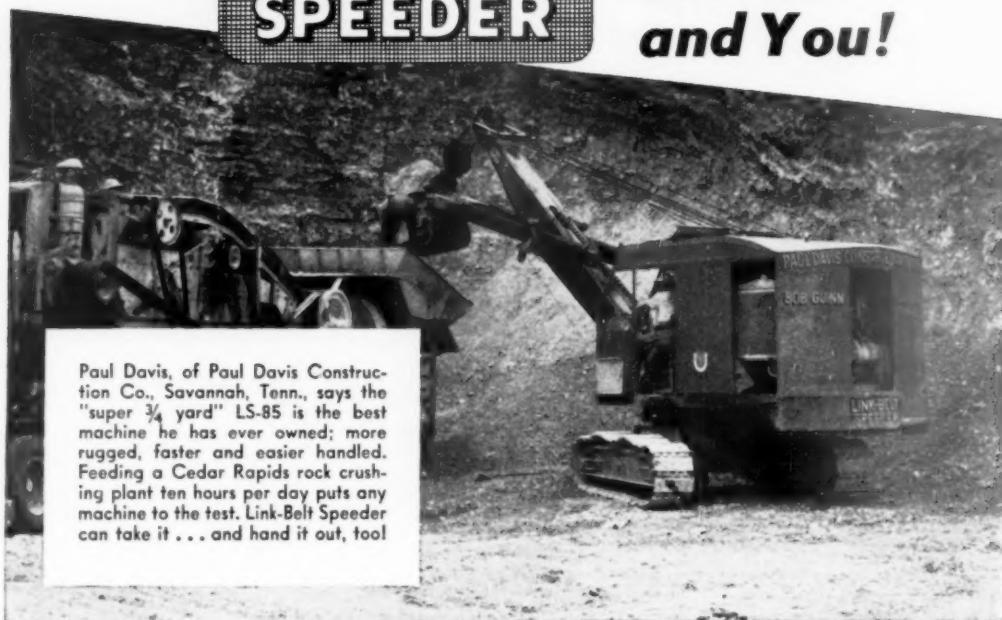
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GENERAL ELECTRIC

There's a

LINK-BELT SPEEDER

**for You ---
and You ---
and You!**



Paul Davis, of Paul Davis Construction Co., Savannah, Tenn., says the "super $\frac{3}{4}$ yard" LS-85 is the best machine he has ever owned; more rugged, faster and easier handled. Feeding a Cedar Rapids rock crushing plant ten hours per day puts any machine to the test. Link-Belt Speeder can take it . . . and hand it out, too!

BROAD LINE MEETS PRACTICALLY EVERY REQUIREMENT

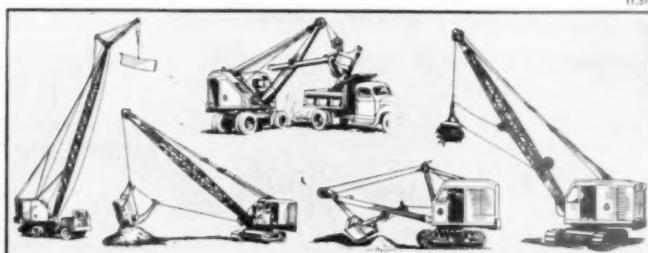
Need a small, nimble, fast-moving, convertible shovel-crane-trench hoe combination for a lot of small jobs? Or a large high capacity dragline for gravel pit or strip mine?—(or something in between?)

The nearest Link-Belt Speeder distributor will show you a line of machines up to 3 yard capacity,

that includes a type and size to suit. All are true representatives of Link-Belt Speeder advanced engineering, long-life, low cost operation. And every Link-Belt Speeder distributor has parts and trained personnel to keep these machines in tip-top operating condition.

•
Can't you see the money-making possibilities in these convertible Link-Belt Speeders?
•

Quick, easy convertibility to any of the usual front-end attachments makes the Link-Belt Speeder a multi-purpose machine capable of working at more jobs, more of the time.



LINK-BELT SPEEDER

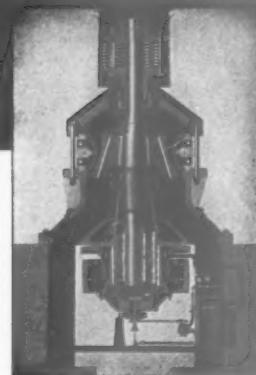
LINK-BELT SPEEDER CORPORATION,
CEDAR RAPIDS, IOWA



**Builders of the Most Complete Line of
SHOVELS-CRANES-DRAGLINES**

KVS

AND



THIS 5½' x 8' KENNEDY AIR SWEPT TUBE MILL PRODUCES 7 TONS

PER HOUR — With a feed of 1¼ x ¾ in. limestone and dust

Use the Kennedy Air Swept Tube Mill to get superfine grinding at bottom costs. The product ground in this tube mill and collected in three cyclones is (1) 5 tons per hr. of 80% thru 200 mesh, (2) 1 ton per hr. of 92% thru 200 mesh, and (3) 400 lbs. per hr. of 99.8% thru 325 mesh. Simple adjustment permits a desired variation from this combination of fine mesh sizes. The mill is driven through the remarkable Kennedy Integral Gear Drive for Tube Mills. This enables the motor to be direct-connected to the high speed shaft. The gears cannot be misaligned or set wrong. Power required to drive the mill is thus greatly reduced.

KENNEDY ROLLER BEARING GEARLESS CRUSHER . . .

With a Synchronous Motor built in its pulley, this machine shows 80% saving in the cost of maintenance and a saving of 30% in power over geared crushers. It has produced 156 tons per hour when set to 7/16" between the head and concaves at the bottom. The motor runs on roller bearings and is continuously lubricated by a force feed lubrication system. The motor is built especially for this crusher.

It is now possible to combine the superior product of a rotary kiln with the operating economy of a vertical kiln with the Kennedy Stone Preheater and Deheater. By partial calcining the material in the vertical kiln, kiln wear and kiln lengths, if recoverers and utilizes exit gases, and has proved so efficient in actual operation that 40% fuel savings and increased output exceeding 20% have been obtained.

Short kilns employing the Kennedy method also acquire an internal glaze which lessens the wear on kiln liners, lowers the power requirements, and reduces formation of fines. Underburned and overburned lime is practically eliminated. Coal feed and lime calcination are switchboard controlled.

The latest in scientific lime production KENNEDY STONE PREHEATER - ROTARY KILN DEHEATER and SOAKING PIT

20% Increase in Capacity — 40% Savings in Fuel

Kennedy-Van Saun Manufacturing and Engineering Corp.

2 Park Avenue, New York 16, N. Y.

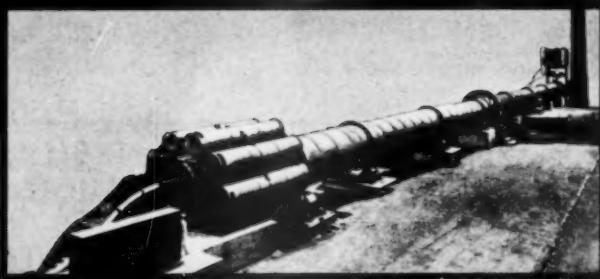
3 WAYS TO SAVE FUEL



A



B



C

A
Heat
Exchanger
for
Dry Kilns

B
Chain
Systems
for
Wet Kilns

C
Unax Cooler Integral
with Rotary Kiln

F. L. SMIDTH & CO.

11 WEST 42ND STREET

ENGINEERS

NEW YORK, N.Y.

"WE HEAR..."

April, 1949

Total public construction put in place during February, 1949, reached \$257,000,000, a ten percent decline from the previous month, but 49 percent above the \$172,000,000 reached in February of last year.

* * * * *

More than half of the roads and streets in Oregon and Washington have been found by State study committees to be below standard, or they are expected to be below standard within a 10 year period. In Oregon, the annual cost for improving these roads and streets under a 15-year program was estimated at \$63,286,000. In Washington, the annual cost under a recommended 15-year program was set at \$76,360,000.

* * * * *

A house that cost \$10,000 to build in 1939 cost \$22,030 in October, 1948, but its cost dropped to \$21,460 in January, 1949, down \$570 in three months.

* * * * *

Steel companies report that every wire reinforcing machine is running to capacity; however, time is lost when changing over from size to size. The companies say that production of steel mesh could be stepped up 20 to 40 percent if the concrete pipe industry would order from the Simplified Practice Recommendation R234-48.

* * * * *

A new one-coat wall covering recently developed is a substance composed of a mixture of soybean oil, styrene and silica sand, with pigment added for color. It can be applied by brush or spray gun on exteriors or interiors, over surfaces of every kind including concrete, stucco, wallboard, brick, stone and plaster, and is said to have a degree of flexibility due to the oil content, and provide resistance to acids, alkalis, fungus growth, and moisture.

* * * * *

Number of jobless workers rose 557,000 in February to a total of 3,221,000, the highest since March, 1942, as non-seasonal layoffs continued, according to a Census Bureau report.

* * * * *

A study of the present status of building codes by the Building Technology Division of the National Bureau of Standards reveals that: most of the codes have not been overhauled for some time; a considerable fraction of municipalities in the United States have no type of building regulation; and over 200 municipalities are completely revising their codes, the latter indicating appreciation of engineer advances in the field of building construction.

* * * * *

Since 1940 the farmer has spent seven billion dollars to improve his farm and obtain better living conditions for his family. Farm income has increased from 6.4 billions in 1940 to 21.6 billions in 1947.

* * * * *

Construction of low-rent public housing by local authorities on an unprecedented national scale may be predicted from a compromise bill recently introduced in the Senate. The measure would authorize starting a total of 810,000 low rent units in six years to be subsidized by federal contributions up to a limit of \$308,000,000 a year for 40 years.

WE HEAR

Cement travels in fast company in Pakistan. A new import licensing policy of this Moslem state of Northern India prohibits the importation of the following articles from any source: silver plate and silver manufactures; gold leaf and gold manufactures; jewelry and jewels; precious stones unset, and portland cement, except white portland cement.

* * * * *

Steel operations were scheduled at 101.4 percent of capacity in the week ended March 12, setting another tonnage record.

* * * * *

Dollar value of new construction put in place during February was 9 percent below January, but 14 percent higher than in February, 1948, according to the Commerce Department. Total value of new construction in February amounted to \$1,146,000,000 compared with \$1,261,000,000 in the previous month, and \$1,009,000,000 in February, 1948. February's total brought the 1949 value of new construction to \$2,400,000,000 or 11 percent higher than in the comparable 1948 period.

* * * * *

Another case of an employe being killed in a concrete mixer has been reported in McPherson, Kan., further emphasizing the importance of practising good safety measures. No one saw the accident, but the victim apparently fell into the mixer while cleaning it. The mixer was stopped when the body was found, but had been going before. Death was caused by a crushed chest and internal hemorrhages into the lungs.

* * * * *

Vehicle mileage increased from 249,000,000,000 in 1945 to 395,000,000,000 in 1948.

* * * * *

An Employer cannot expect the National Labor Relations Board to set aside a collective-bargaining election in his plant merely because a foreman took an active part in organizing the union. The Board rules that such action by a foreman does not justify the employer's refusal to bargain with the certified union, so long as the foreman did not actually coerce the employees to join the union.

* * * * *

Since the passage of the Federal Aid Airport Act in May, 1948, Congress has appropriated over \$100,000,000 which has been allocated to approximately 1000 projects. As of February 23, 640 projects were under contract, totalling \$67,000,000 in Federal funds. Contracts have been completed on 215 projects and a total of \$26,500,000 in Federal funds has been expended on partial and final payments. Since these funds are matched by sponsors, the total payments to contractors are about double this amount.

* * * * *

From August, 1934, through December, 1948, the Federal Housing Administration insured \$3,338,550,288 of Property Improvement Loans under Title I of the National Housing Act, according to Arthur J. Frentz, assistant commissioner.

* * * * *

Ultimate output of atomic energy in this country may be as great or greater than present output of coal power "and will operate at a lower cost, at least as far as fuel expenditure is concerned." That's the Atomic Energy Commission's latest view on power prospects providing that the cost of uranium does not rise markedly, and that the theoretical possibilities of "breeding" atomic fuel can be realized in engineering practice.

THE EDITORS

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York, Pennsylvania and Wisconsin are outstanding dairy states, not because of their finer cows or more industrious farmers, but because their soil is rich in lime, the source of calcium.

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Editor's Page

Salesmanship Will Preserve Agstone Industry

A YEAR AGO we commented on the degree of dependence of the agricultural limestone industry upon federal soil conservation payments, having just summarized the actual impact on the industry when, for a two-month period in 1947, financial aid to farmers had been cut off completely. The effect was a catastrophe for a great majority of producers, many of whom were forced out of business until ACP funds again began to flow. The almost disastrous results revealed the vulnerability of an entire industry and emphasized the great need for establishment of the industry on sound business principles. If anything, the record shows little progress in that direction.

Volume of Liming Materials

The charts and tables in the article by Ralph S. Trigg, Production and Marketing Administrator, U. S. Department of Agriculture, in this issue are interesting and informative. They show the enormous growth in the application of liming materials under the ACP program, which, there is no denying, has contributed immensely to increased production of crops on our farms. But, they also show that the ratio of liming materials spread continues in rough proportion to farm income and to the amount of soil conservation payments. That direct relation deserves study and should emphasize that a selling job is required of the industry if it would continue its volume of business and growth to meet national requirements for liming materials which have not yet been approached in any one year.

Farm income is three times what it was a few years back, which is fine for the nation and a tribute to the farmer and the experts in agriculture who have contributed so much, but are farm prices likely to continue at present dizzy heights? Abundant farm production is expected to continue, to meet the nation's increasing needs for food and to supply much of the world, but farm prices depend upon general prosperity of the nation and normally will fluctuate with rises and falls in the overall business curve. The question is, what activity will the farmer discontinue first in reducing expenditures, if he should experience a drop in income? If he hasn't been shown that liming has been profitable or if he hasn't been convinced that it will bring him return, the answer is simple.

The soil conservation program must also be considered in its overall objectives. Liming as such is only part of the conservation job and it is to be anticipated that increasingly greater amounts of annual appropriations will be allocated

for the elimination of erosion and for other conservation practices. Thinking in the Department of Agriculture is more in that direction every year, which means that funds strictly for the purchase of liming materials will have to be spread thinner or that many farmers otherwise would not benefit from that form of assistance, unless, of course, vastly greater overall appropriations will be voted by Congress. So, it appears that the farmer will soon be required to pay more than the 40-odd percent of the cost of liming materials which he must now pay out-of-pocket and which is exclusive of costs of transportation, distribution and spreading. It will naturally require far more sales effort to convince the farmer to part with more of his own money for a product which, by and large, he believes has been slow in demonstrating its ability to increase his crops.

Educational Selling

As far as the agricultural limestone industry is concerned, its immediate task, if it would continue prosperous, is to institute a job of educational merchandising and sales promotion that will throw out of balance that relation of use of liming materials to farm income and conservation payments which the charts, to date, show to be more or less in direct proportion to each other. The liming use curve must, in the years ahead, reflect higher tonnage per unit of farm income and per dollar of subsidy payment.

Liming needs have been scaled upward to 70 million tons annually, to accomplish just a maintenance job on the nation's soils which is more than double the 1947 peak and represents the achievable goal. To approach it, the agricultural limestone industry must utilize every sales tool it has. It must employ every bit of evidence stemming from research that it has at its disposal to prove to the farmer that liming is profitable to him, and must cooperate with the farmer in order that proper application be made so that expected results will materialize. There are now available simple soil tests which producers should urge the farmer to use and there soon will be available the results of new researches in limestone utilization, which should be sought out and put to use. The job can be put over if the farmer will be convinced.

Bron Nordberg



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Rocky's

NOTES

Nathan C. Rockwood

Base Exchange in Soils and Concrete

PART OF THE SHORTCOMINGS of research, it seems to us, is the tendency to follow narrow, specialized paths, with little attention to developments in other fields of science, which may or may not furnish helpful clues to answer one's own special problem. This tendency is natural and understandable, because as science in any one field progresses, the literature in this field usually increases so rapidly that in a day of high-pressure demands on industry, and its employees, there is little time left for specialists to explore other fields.

Were the writer 40 years younger he would be inclined to pursue studies to fit himself to be useful in such a capacity. As the case stands, he must be content with a mere smattering of knowledge of many branches of science, and as a journalist endeavor to "needle" others who have more detailed knowledge of these sciences into developing some exact and useful information. It is also hoped that this dabbling with scientific data from other fields will inspire younger men of research bent to use more imagination in their work, and not feel tied down to procedures, facts, data and conclusions which their predecessors in the field have seen fit to exploit. With that explanation we trust the reader will consider this and similar discussions, before and after, as not intended to be erudite or accurate in scientific information, but as stimuli for others who are interested.

Base Exchange in Soils

Having acquired a bit of familiarity with base exchange phenomena in soil chemistry, from articles in our own journal by Dr. W. A. Albrecht, of the University of Missouri, and elsewhere, we have been thinking that this chemistry of base exchange must also be a factor in the hydrating and hardening, and often subsequent disintegration of concrete. Briefly, base exchange is the capacity of soil particles to exchange one chemical substance for another. The fertility of soils and the raising of crops are largely dependent on this base exchange, leaving out for the moment such factors as climate, rainfall, etc.

For a better understanding we needed a textbook on the subject, and there has come to hand just such a book—"Cation Exchange in Soils," by Dr. Walter P. Kelley, professor emeritus, soil chemistry, University of California.* "Cation exchange" and "base exchange" mean practically the same thing. In spite of our lack of any exact knowledge of soil chemistry, we find much that should prove helpful for providing a different approach to cement and concrete research. Also, of course, it is of real value to scientifically minded producers of agricultural lime and limestone who desire some understanding of the part played by their product in soil chemistry, since it is one of the most active participants in base exchange.

Cations and Anions

An ion is a minute particle of matter—an atom or molecule, or a cluster of atoms or molecules. They are divided into two kinds, cat-ions and an-ions, according to whether they carry positive (+) or negative (—) charges of electricity. The cations are basic or alkaline and the anions are acidic. The theory of colloid (and soil) chemistry is that a particle carrying a negative charge will attract and hold on its surface a particle or particles charged with positive electricity, provided water or liquid is present so that movement is possible. Clay, of which soil is chiefly composed, is a mixture of various aluminum silicates with sodium, potassium, calcium, magnesium, etc., either chemically combined in the silicate, or with these mineral element cations clinging to the anion element particles by electrical attraction. The silica in the anion unit is of course the chief negative attracting force.

The ions do not necessarily consist of a mineral element. Some substances mixed with water undergo hydrolysis, which means they separate into two groups of ions. For example calcium hydroxide, $\text{Ca}(\text{OH})_2$, may divide into Ca cations and $(\text{OH})^-$ hydroxyl ions, which are negatively charged; similarly calcium carbonate, or limestone,

CaCO_3 , can change with the help of water into Ca cations and $(\text{CO}_3)^{2-}$ radicals which are negatively charged ions. Water itself, H_2O , can be ionized and provide H ions which are positive and the OH negative ions. When we speak of the pH of a liquid or a soil, we are describing it in terms of a measure of the H ions it contains. Thus, pure distilled water has a pH of 7, or is practically neutral, an acid material a pH of less than 7, and an alkaline or basic material a pH of more than 7. (The pH value is the logarithm of the reciprocal of the amount of H ionization.)

The pH value of a soil has an important bearing on its base exchange capacity; which is one reason soils are "limed." There seems no reason to doubt that the pH value of a concrete mixture must also be an important factor in determining the end products. For example, soil chemists know that a soil too highly charged with exchangeable sodium ions, while it has a high pH, is not a good medium for base exchange—in fact it is an alkali soil and practically sterile. It will not exchange its sodium cations for calcium cations until it has been at least partly neutralized with an acid salt such as CaSO_4 or gypsum. Perhaps this suggests a reason for the result of reactive aggregates and alkalies in portland cement. The sodium becomes so concentrated in spots, that the normal cation exchange, which would result in Ca (calcium) cations replacing some or all the Na (sodium) cations can not proceed. Similarly, the effect of an interground pumicite may be explained as a dilution or dispersion of the sodium cations.

Except in the case of the alkali-reactive aggregates problem, where it is obviously advantageous to replace soluble sodium with relatively insoluble calcium in or on the silicates (or the silica gel), one may say that the objective of soil chemistry is the opposite of that in concrete chemistry. *Unstable* soils are desired, in order that soil minerals may be rendered available to plants. A stable soil would be inert or sterile. On the other hand, a *stable* mixture of much the same minerals is the objective in concrete making. Hence, one may question an abundance of free calcium hydroxide in concrete as a means of acquiring stability, when its use in soils is expressly to promote instability.

Again, most stable soils (infertile or inert soils) are on the acid side. Yet we make cement way over on the basic side, where only the continuous maintenance of a pH of about 11.5 will keep the $2 \text{CaO} \cdot \text{SiO}_2$ or $3 \text{CaO} \cdot 2 \text{SiO}_2$ silicates stable. Our reading of "Cation Exchange in Soils" is to the effect that we should try to reduce base exchange in concrete to a minimum, and at least one way to do this is to tie up the bases in combinations which have few free cations to exchange. Apparently the calcium $\text{CaO} \cdot \text{SiO}_2$ is such a combination.

*Published December, 1948, by Reinhold Publishing Corp., New York City, price \$4.50.

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LABOR RELATION TRENDS

Contract Trucking and F.L.S.A. Coverage

By NATHAN C. ROCKWOOD

A CASE INVOLVING the contract haulage of sand and gravel, produced and moved entirely within the borders of a single state, was decided recently by the U. S. District Court of Virginia in McComb, etc. v. Carter. It is of general interest because of its implications; the same reasoning could be applied to haulage of a commodity like agricultural limestone, for use on farms, the products of which are shipped in interstate commerce.

Hauling Highway Material

The crux of the issue was that the material hauled was for the maintenance and repair of state highways. Action was brought by Administrator of the Fair Labor Standards Act McComb for an injunction restraining the trucking contractor from violating the Act. Following is the essence of the decision of the Court:

"1. The defendant is an individual operating an establishment in Richmond, Va.

"2. Defendant is exclusively engaged in hauling for the Southern Materials Co., pursuant to a contract between him and that concern.

"3. During the period covered by the complaint in this case approximately one-third of the defendant's total receipts was derived from the transportation of sand and gravel ordered from the Southern Materials Co. by the Virginia Department of Highways. This business consisted of transportation by the defendant's employees in his trucks to construction sites of materials used in the maintenance, repair and reconstruction within the State of Virginia of highways constituting a part of the state's highway system.

"4. The said state highway system is regularly used interchangeably by vehicles moving in interstate and intrastate commerce, and is regularly used to carry the United States mails.

"5. The sand and gravel transported by the defendant's employees to the Virginia state highway system are all produced in the State of Virginia.

"6. The defendant does not segregate the work performed by his truck drivers and mechanics with respect to the Virginia state highway system from other work performed by them.

"7. The mechanic employed by the defendant spends all or practically all of his time in repair and maintenance of the trucks used in the defendant's business.

"8. The defendant has not paid his truck drivers or mechanic at the rate of time-and-one-half their respective regular rates of pay for hours worked by them in excess of 40 in a week.

"9. With respect to his truck drivers and mechanic, the defendant has failed to keep some of the records required by Title 29, Chapter V, Code of Federal Regulations, Part 516, including a record of the hours worked each day and each week by the said truck drivers and mechanic.

Not Common Carrier

The Court's conclusions were as follows:

"1. This court has jurisdiction of the parties and of the subject matter of this cause.

"2. The truck drivers and mechanic employed by the defendant are engaged in commerce within the meaning of the F.L.S.A.

"3. The defendant's truck drivers and mechanic are engaged in handling, transporting, and otherwise working on sand and gravel used in the maintenance, repair or reconstruction of highways carrying interstate trade and commerce, and the said employees are engaged in production of goods for commerce within the meaning of the F.L.S.A.

"4. The defendant's truck drivers and mechanic are not engaged in the transportation of property in interstate commerce within the meaning of the Motor Carrier Act of 1935, and are not within the scope of Section 13(b)(1) exemption from the F.L.S.A.

"5. The defendant has repeatedly violated the requirements of Section 11(c) and 15(a)(5) of the F.L.S.A.

"7. The plaintiff [McComb] is entitled to the entry of a permanent injunction as prayed for in the complaint herein."

Administrator's Arrogance Over-Ruled

In another trucking company case the U. S. Court of Appeals, Fifth Circuit (New Orleans, La.) over-ruled a lower court decision (Northern District of Texas) which would have compelled the Hunsaker Trucking Contractor, Inc., to produce a truckload of records on the demand of F.L.S.A. Administrator McComb. The subpoena to produce the records was not obeyed and the District Court was petitioned to issue its order directing the records be produced.

The employer did not dispute the contention that its employees were engaged in interstate commerce. It did deny that all the records sought were material or appropriate to determine whether or not there had been violations of the Act, and averred that most of its employees were under the jurisdiction of the Interstate Commerce Commission and exempt from

the provisions of the F.L.S.A. It was stated that the appellee (the trucking contractor) was willing to produce any records that were reasonably necessary, but to produce all called for was a physical impossibility, would take from their work most of the employees to assemble the papers and a large truck to carry them, whereas the essential facts could be reasonably ascertained from the payroll records and time sheets of its employees, and the logs of their drivers, which it offered to produce.

What the administrator had demanded were: (1) The records showing the hours worked by, and the wages paid to, each of the company's employees over a two-year period; (2) the records showing the names of the company's customers and the type of work done for each of them during the same period; (3) the records showing the source and receipt of goods from outside the State of Texas, in the same 2-year period; (4) the records showing the source and destination of goods hauled or transported from points within the State of Texas to points outside during the same two years.

The Court said: "The administrator could rightly see for himself who the employees were, and what each did, what each was paid, and which were under partial exemption. To do this, however, would not probably require the collection and production of all records of customers' transactions, and bills of lading and other records of each interstate purchase and transportation of goods." * * * If after examining these [the payroll records] the administrator should find need for additional information, let him apply under this petition for a further order." * * *

One of the judges (Hutcheson) in his concurring opinion made these very pertinent and caustic remarks, which should give encouragement to other harassed employers who are subject to similar arbitrary and often arrogant demands of the F.L.S.A. administrator and his numerous assistants:

Citizens Still Have Rights

Said the judge: "Notwithstanding the changing climate of opinion in some governmental circles and the strange and repugnant trend there toward statism and rule by fiat, the Constitution is still basic law. No matter, then, what statutes may be enacted, what regulations imposed, what action taken by governmental agencies, the courts must be ever on the alert to preserve and protect constitutional rights."

"I will agree that the rights and duties of citizen and government are mutual and that it is on a two-way street that one arrives at them. I will agree, too, that sometimes a citizen is obstructive beyond his rights, uncooperative where he ought to be

(Continued on page 154)

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the Personal Side of the news

Chairman of the Board

HOWARD W. JORDAN, a director of the Metropolitan Sand and Gravel Corp., Port Washington, N. Y., has been appointed chairman of the board.



Howard W. Jordan

ELLIOTT HARRIS has been named concrete technologist. Metropolitan is a wholly-owned subsidiary of the Morewood Realty Corp. and Mr. Jordan is a director of both companies. Prior to his association with Pennsylvania Rubber Co., where he served as president for seven years before moving to New York, he was vice-president of Montgomery Ward and Co. in Chicago and New York. For the past five years he has served as a director for the Federal Reserve Bank of Pittsburgh.

H. F. GARVIN PELSUE is president of Metropolitan.

Promotion Manager

JOHN W. MOORHEAD has been made product promotion manager for the Building Products Division of Great Lakes Carbon Corp., New York, N. Y. He will administer the promotion program for rock wool building insulation products and for Permalite plaster and concrete aggregate. Mr. Moorhead joined the company early in 1947 after 18 years with the Aluminum Company of America where he was in charge of building industry sales in New York, Chicago and the mid-west. He is a graduate in Civil Engineering of Rose Polytechnic Institute, Terre Haute, Ind. The building products division of Great Lakes Carbon Corp. operates rock wool plants in Youngstown, Ohio; Easton, Penn.;

and Argo, Ill., and a Permalite manufacturing plant in Torrance, Calif. Plans are now complete for a new Permalite processing plant on the eastern seaboard.

Association Officers

HARRY E. BATTIN, Jr., vice-president of Callanan Road Improvement Co., South Bethlehem, N. Y., has been elected president of the New York State Crushed Stone Association, Inc., Albany, N. Y. HIRAM W. BARNES, sales manager of Dolomite Products Corp., Rochester, N. Y., was named vice-president, and H. E. RAINER of the Federal Crushed Stone Corp., Buffalo, N. Y., was made treasurer. Directors of the Association are Milo Crouse, Buffalo Crushed Stone Corp.; Clarence A. Munz, Eastern Rock Products, Inc.; John Rice, Jr., General Crushed Stone Co.; Wilson P. Foss, III, New York Trap Rock Corp.; William H. Peckham, Catskill Mountain Stone Corp.; Myron J. Wurtenberger, Frontier Stone Products, Inc.; and Irving K. Cox, Allis-Chalmers Mfg. Co., New York, N. Y.

New Officers

JOSEPH BROBSTON, president of the Hercules Cement Corp., Philadelphia, Penn., has been elected chairman of the board of directors. D. S. MACBRIDE, formerly executive vice-president, succeeds Mr. Brobston as president, and PAUL J. RUTAN, sales manager, becomes a vice-president. Mr. Brobston started his career in the cement industry about 50 years ago. He was identified for 25 years with the Dexter Portland Cement Co., then with Nazareth Cement Co., and for the past 15



Paul J. Rutan



D. S. MacBride

years with Hercules. He is one of the original members of the Portland Cement Association and has been active in its affairs since 1906. For more than 30 years he has been a member of Committee C-1 on Cement, American Society for Testing Materials.

Mr. MacBride, during his 30 years in the cement industry, has been connected with the Portland Cement Association as district engineer; Lone Star Cement Corp. as vice-president, Indiana and Pennsylvania Divisions, and manager of the Inco Division. During the past 11 years with Hercules he has been successively vice-president of sales, executive vice-president and now president.

Mr. Rutan has devoted 40 years to the sale of building materials. His first assignment was with the Charles Warner Co. in Delaware and Maryland, later becoming vice-president and sales manager at Miami, Fla. He entered the cement business in 1933 with the Pennsylvania-Dixie Cement Corp. as district sales manager at Rochester, N. Y. In 1939 he joined Hercules as assistant sales manager.

Elected Director

HENRY W. COLLINS, executive vice-president of The Celotex Corp., Chicago, Ill., has been elected a director of the company. Mr. Collins became associated with Celotex in 1926 as sales representative in the New York area. Later, he was transferred to Chicago as manager of the sales division, and in 1936 went to New York as manager of that division. Two years later he returned to Chicago as vice-president in charge of merchandising. He has been executive vice-president since 1948.

NEWS

Sales Manager

FRANK H. BRUNSON has been appointed sales manager of Black-Brolier, Inc., Houston, Texas, manufacturers of Featherlite, concrete



Frank H. Brunson

tile and other concrete products. Mr. Brunson, who has been in the building materials field in Houston and New Orleans for the past 10 years, will direct and coordinate sales activities.

Lehigh Appointments

HENRY B. BURKS, assistant manager and supervising chemist at the Birmingham, Ala., plant of Lehigh Portland Cement Co., Allentown, Penn., has been appointed manager of the plant to succeed R. H. MACFETRIDGE, who has retired after 44 years of service with the company. Mr. Burks has been associated with the company for 11 years, having joined the Birmingham plant in 1937 as an engineer. He holds a bachelor's degree in chemical engineering from Georgia Tech and a master's degree from Columbia University. During World War II he served as a 1st Lieutenant of Coast Artillery in the United States in addition to service in the Philippine Islands. He was discharged with the rank of Major and returned to his former position of engineer at the Birmingham plant, subsequently becoming assistant plant manager.

Mr. MacFetridge is well known in the cement industry. As a young man he studied engineering at Lehigh University and was employed by the Lehigh Portland Cement Co. in 1904. After a short time in the machine shop, he went to Mitchell, Ind., to help build the No. 1 and No. 2 plants at New Castle, Penn., and the plant at Belleville, Ontario. He was made superintendent of quarries at Mitchell and then superintendent of plants No. 1 and No. 2 at New Castle, Penn.

going from there to the Fordwick, Va., plant as superintendent. He returned to New Castle as superintendent in 1918 but went to Birmingham in 1922 to take charge of constructing the new plant there, becoming superintendent upon completion of the plant. This title has been changed in recent years to plant manager. Mr. MacFetridge has been a leader in safety work and his plant achieved perfect safety records over a period of years.

JAMES A. TROTT, formerly assistant chemist, has been appointed chief chemist of the Birmingham plant. He has been with the plant since 1923. Mr. Trott studied chemical engineering at the University of Alabama.



H. D. Baylor and Harry E. Regan, Sr.

Heads Research Division

R. S. BRADLEY, director of research, A. P. Green Fire Brick Co., Mexico, Mo., has been appointed head of the division of research and engineering. This is a new division composed of three sections, namely, research engineering, headed by A. R. Lesar; industrial engineering, by W. D. Clark; and plant engineering, by J. C. Potts. Mr. Bradley has been associated with the company since 1923. He is an active member of the American Ceramic Society, the Institute of Ceramic Engineers, the Technical Advisory Committee of the American Refractories Institute, Vice-Chairman of the CA Committee of the American Society for Testing Materials, and the Missouri Society of Professional En-

gineers.

ment last year, were recently presented with gold watches in honor of their 61 years of service with the company. Both men started with the firm in 1887. Watches were given to 124 employees who have seen service of 30 years or more.

A 30-Year Club was formed with 35 employees of the plant and 10 employees of the Louisville office as members. Two women were in the group from the office. They are Miss Grace Walker and Miss Henrietta Neureitta.

Employees who have been with the company more than 50 years received engraved gold bands with their watches. Fourteen of these were presented. Among the 50-year men was William S. Speed, chairman of the board, who has been with the company 53 years. Also receiving a watch was H. D. Baylor, president of the Louisville Cement Corp., which operates the Speed plant. Mr. Baylor is also vice-president of the Louisville Cement Co.

Turns to Merchandising

J. FRANK BARTON, chief chemist and research engineer, Federal Portland Cement Co., Inc., Buffalo, N. Y., has resigned to enter the merchandising field with the Household Art Co., Hornell, N. Y. Mr. Barton received his B.S. degree in chemistry and geology at the University of Maryland. He started his career in the cement industry in 1925 as analyst for the New Egyptian Portland Cement Co., Port Huron, Mich. He has given considerable time to research with pizzolana cements and to studies for developing a scientific approach to manufacturing control of home and industrial insulation. Among his accomplishments are the development of an artificial pizzolana material for use in concrete, a general purpose masonry cement, and a high temperature insulating cement. He has also developed and patented a "dry" chemical feeder. An article by Mr. Barton appeared in the September, 1944, issue of ROCK PRODUCTS, p. 49. He plans to make his home in Canisteo, N. Y.



J. Harry Lemmon, former superintendent of the Milltown plant, has the longest service record there, having completed 58 years before his retirement.

Chairman of the Board

BEN G. DAHLBERG, chairman of the board of directors of the Celotex Corp., Chicago, Ill., has been elected chairman of the board of governors of the Building Officials Foundation, New York, N. Y. He succeeds the retiring chairman, Joseph P. Wolff, commissioner of the department of buildings and safety engineering, City of Detroit. Harold Bochenstein, president of Owens-Corning Fiberglas Corp., Toledo, Ohio, and Henry Bohnsack, president of the International Steel Co., Evansville, Ind., have been elected members of the board of governors. The newly elected executive committee, in addition to Mr. Dahlberg, consists of J. H. Thornley, president, Western Foundation Co., New York; Loring Washburn, president, S. H. Pomeroy Co., New York; Albert H. Baum, commissioner of buildings, City of St. Louis; and Fred C. Bergeson, building inspector of the City of Rock Island.

Elected President

A. L. WORTHEN, for many years vice-president of the Connecticut Quarries Co., and vice-president and general manager of its successor, the New Haven Trap Rock Co., New Haven, Conn., was recently elected president of the company. Mr. Worthen, a civil engineering graduate of Worcester Polytechnic Institute, is a past-president of the National Crushed Stone Association.

Given Gold Watchfob

WILLIAM WALLACE MEIN, JR., president, Calaveras Cement Co., San Francisco, Calif., was presented a gold watchfob by Dr. W. E. Wrather, outgoing president of the A.I.M.E., at the recent meeting in San Francisco, on behalf of the members of the San Francisco section, in recognition of his work as program chairman of the section during the past year. Mr. Mein also served as associate chairman of a session on mineral aggregates and structural materials, sharing honors with Dr. Oliver Bowles of the U. S. Bureau of Mines, one of the nation's foremost experts on the technology and economics of industrial minerals.

New Zealand Engineer

M. A. CRAVEN, formerly engineer for Certified Concrete Limited, New Zealand, has been appointed as engineer to direct the activities of the New Zealand Portland Cement Association. A short time ago Mr. Craven completed an 18 months' tour of the United States and Canada, visiting many principal cities, several Bureau of Reclamation projects, the Portland Cement Association, the National Bureau of Standards, the University of



M. A. Craven

Illinois, and the University of California. Mr. Craven is an engineering graduate of the University of New Zealand. He is a member of the American Society of Civil Engineers, Institution of Civil Engineers (U.K.), New Zealand Institution of Engineering, and American Concrete Institute. Cement companies holding memberships in the Association are Wilsons (N. Z.) Portland Cement Limited, Portland, North Auckland, Stan Reid, manager; The Golden Bay Cement Co., Ltd., Tarakohe, Nelson, D. O. Whyte, manager; and the Milburn Lime and Cement Co. Ltd., Dunedin, Otago, G. A. Henderson, general manager. Objectives of the association are to improve the use of cement and find new uses for this product.

Quarter-Century Club

PAUL SUNDERLAND, chairman of the board of the Ash Grove Lime and Portland Cement Co., Kansas City, Mo., has joined his father, Lester T. Sunderland, chairman of the executive committee, and his brother, Allen B. Sunderland, president and secretary, in becoming a member of the Quarter-Century Club of the company. Fourteen employees of the plant at Chanute, Kans., also joined the club recently and each was presented with a special award check representing \$1 for each year of continuous service. At the present time, 65 employees in the various plants and offices are members of the club.

Sponsors Lecture

CASE INSTITUTE of Technology recently sponsored a lecture on "Quality Concrete," in the Physics Lecture Room of the college. J. S. Kennedy, field engineer with the Portland Cement Association, addressed the meeting.

OBITUARIES

EDGAR L. SMITH, retired president of the Alliance Sand Co., Inc., Northampton, Penn., died March 3, two months after his retirement. He was 63 years old. Mr. Smith had been associated with the company for 25 years, starting as a salesman and subsequently becoming secretary-treasurer and then president.

ERIC BURKMAN, secretary, United States Rubber Co., New York, N. Y., died February 26, while on vacation in St. Thomas, Virgin Islands. He was 56 years old. Mr. Burkman was also secretary of the board of directors, the executive committee and the finance committee. He was a director of Latex Fibre Industries, Inc., Beaver Falls, N. Y., and the Frank W. Gorse Co., Inc., divisions of U. S. Rubber Co.

LEWIS R. FERGUSON, former vice-president of the Dallas, Texas, office of the Lone Star Cement Co., New York, N. Y., died at his home in Dallas on February 23. He was 68 years of age.

ALFRED W. THORN, retired president of the Thorntown Cement Co., Buffalo, N. Y., died of a heart attack at his home in Buffalo on February 26. He was 85 years old. Mr. Thorn was a pioneer in the cement industry. At one time he was associated with the Alpha Portland Cement Co., New York, N. Y., and the Lehigh Portland Cement Co., Allentown, Penn. He retired about 15 years ago due to ill health. At that time he maintained offices for the Thorntown Cement Co. in Buffalo, N. Y., Toronto and Montreal, Canada.

HARLAN ABBOTT BROWN, associated with the Buffalo office of the Lehigh Portland Cement Co., Allentown, Penn., died at his home in Orchard Park, N. Y., on March 10, after a long illness.

WILLIAM EARL BOWMAN, sales manager, Crew Builders Supply Co., Cincinnati, Ohio, died March 6. He was 65 years of age and had served as sales manager for 20 years.

GEORGE J. MARSH, president and general manager of the Consumers Materials Co., Cincinnati, Ohio, died March 9 at the age of 56. He was one of the organizers of the company 12 years ago and had served as vice-president for more than 10 years.

W. E. HEFFERNAN, vice president and organizer of The Ellerman Co., Salt Lake City, Utah, died suddenly at his home on December 6. He was 49 years old. Prior to forming the company about 10 years ago, Mr. Heffernan was associated with the Utah Copper Division, Kennecott Copper Corp., for 20 years. He was born at Terre Haute, Ind., moving to Salt Lake City with his parents in 1905, and has resided there ever since.



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INDUSTRY news

Limestone Company Sold

HORSEHEAD LIME CO. properties at Williams, Ore., have been sold to W. H. Leverette, former president, who recently obtained judgment against the company for sums totaling over \$230,000. The properties, including some of the best quality limestone and marble in southern Oregon, were operated by another company until the formation of the Horsehead Lime Co. by Leverette and his associates, Vernon Vaughn, W. H. Holloway and W. E. Coleman. During the period between 1933 and 1943, the operation employed up to 50 men full time.

Development of the plant by the Horsehead company included a substantial building program which would allow employment of nearly 100 men, but the plant never went into operation after the buildings were completed. Sale of equipment and personal property assets of the company were conducted previously and all bought by Mr. Leverette prior to purchase of the real property holdings.

Seek to Stop County From Selling Rock

SUIT has been brought against Gage county, Neb., by its residents for operating a rock crusher and quarry for the purpose of selling crushed rock in competition with private business. The petition claims that the county has been "illegally disposing of public money and illegally creating debts and obligations that must be paid by taxation." Since Gage county has purchased the rock crusher it has been crushing rock for improvement of mail routes, but also has been selling the material to private individuals.

North Carolina Site for Cement Industry

ESTABLISHMENT of a new North Carolina industry, with an annual business volume of at least \$8,000,000, may result from a research project which has shown that portland cement can be made from native raw materials, according to Dean J. H. Lampe of the School of Engineering at the college. Small-scale production of the material, meeting A.S.T.M. specifications, has been accomplished in the laboratories of the School of Engineering after investigation and experi-

mentation under a program sponsored by the U. S. Department of Commerce. At present consumers in North Carolina pay out-of-State manufacturers approximately \$8,000,000 per year for material used locally. The deposits of raw materials are located near each other and near rail and highway facilities.

Oppose Gravel Pit

A PETITION opposing operation of a gravel pit near White Station, Tenn., has been presented to the Shelby County Board of Adjustment. The proposed pit would be located near Park, between Mt. Moriah and Hayne Roads, on property owned by Country Club Estates and leased by Memphis Stone and Gravel Co. Attorney for the petitioners claims that operation of the pit would depreciate property values in the section which is "one of the few outlying sections still residential." He also mentioned the noise, sanitation problems, heavy traffic and ruined landscape which probably would be caused by the operation. The representative for the gravel firm, said his clients stand to lose business amounting to \$75,000 to \$100,000 by delays before operation.

New Mining Association

NORTHWESTERN MINING ASSOCIATION has been formed at Boston, Mass., by a group of New England quarry and mine operators to help to develop and utilize mineral resources. George Adams Ellis was elected.

Opens New Quarry

HERNER QUARRIES, Nehawka, Neb., has opened a new quarry at Auburn, Neb., from which it is supplying two river improvement contractors with a large tonnage of hard rock. Only one shovel is being used at the quarry, which does almost all stripping of overburden and which loads quarry stone. The rock is loaded into trucks via a belt conveyor. Average tonnage per 8-hr. shift is 400, although there have been some 600-ton shifts. Twelve 3-cu. yd. trucks do the hauling to Missouri River barges.

Establishes Gravel Plant on Missouri River

RAY C. LAROWE has erected a crushing and screening plant at a newly-opened 23-acre gravel pit on the banks of the Missouri river, six miles southeast of Mobridge, S. D., where gravel is being turned out in four sizes at the rate of 2000 to 3000 cu. yd. per day.

The material tests up to 98 percent silica according to Mr. LaRowe, and the supply is "almost inexhaustible." The four grades of material being produced are: plastering sand, $\frac{1}{4}$ - and $\frac{3}{8}$ -in. sand, and $\frac{3}{8}$ -in. rock.

Overburden is removed by two Caterpillar tractors with bulldozers. A 120-ft. conveyor belt carries gravel from the pit to the screening and washing equipment. Six trucks are being used for hauling.



Truck loading hoppers at sand and gravel plant in operation near Mobridge, S. D.

NEWS

Renew Campaign for Palm Springs Cement Plant

SAMUEL GIBERSON has renewed a campaign to build a cement plant eight miles from Palm Springs, Calif., under a new zoning ordinance passed by the county. Attorneys for Mr. Guiberson asked the county to rezone 11,000 acres of land in the vicinity of the cement plant site into a manufacturing zone where no permit is required for industry and where virtually no county controls would exist. Such zoning is included in the zones which the ordinance says may be activated. The attorneys filed petitions signed by 21 property owners and Mr. Guiberson asking for the de-controlled zone and stating that the county is lacking in industry and needs it particularly at this time. The petitions said agriculture and citrus can no longer support the county and that the area they were asking to be rezoned is located in the desert where there are natural mineral resources which should be developed. Mr. Guiberson's court suit for an injunction to keep the county from interfering with the plant is still pending in Federal District Court in Los Angeles.

Plaster Aggregate

COMBINED METALS REDUCTION CO., Salt Lake City, Utah, operating at Pioche, Nev., is producing Panacalite plaster aggregate from one of several deposits of perlite in the vicinity of Caliente. The crude rock is crushed and sized to definite specifications at a plant in Caselton and then sent to "popping" plants throughout the country. Panacalite is processed at the company's plant at Bauer, Utah, where capacity production is 10 tons of aggregate per 8-hr. shift. E. H. Snyder is president of Combined Metals Reduction Co.

City of Boulder, Colo., Only Supplier of Gravel

THE CITY OF BOULDER, Colo., has adopted a policy governing sale by the city of gravel and asphaltic materials to private property owners for use in surfacing driveways, parking lots, non-city streets and alleys. The city is the only local source of road gravel and black-top material and, in accordance with the new policy, will continue to furnish these materials as long as no other source is available.

Expand State Cement Plant

THE CITY of Yankton, S. D., has sent a request to the State legislature to consider establishing a new cement plant west of town, on the site of a former cement plant. Preliminary investigations in the area indicate that the raw materials there would produce cement meeting U. S. Bureau of

Standards specifications. The action came following recommendations by the State Cement Commission that \$1,500,000 be authorized in revenue bonds to build additions to its Rapid City plant.

Mine Personnel Complete First Aid Program

ROBERT S. MCCLELLAN, general superintendent, Gouverneur Talc Co., Gouverneur, N. Y., has announced that a 15-hr. course in "First Aid and Accident Prevention" has been completed by all personnel of the company's Balmat mine. The company is the first mining project under supervision of the Albany branch of the U. S. Bureau of Mines, covering nine northeastern states, to attain 100 percent training of all personnel in accident prevention.

Rock for Airport

CLARKSON CONSTRUCTION CO., Kansas City, Kan., using a large rock crusher, originally built for use in India during the war, to turn out an estimated 1000 tons of crushed rock per day that will eventually be foundation for new runways at the Municipal Airport.

Completes Improvements

LONE STAR CEMENT CORP., New York, N. Y., recently completed more than \$1,000,000 in improvements at its New Orleans, La., plant. Improvements are said to increase plant capacity 50 percent.

Coming Conventions

May 5-7, 1949—

National Lime Association, 31st Annual Convention, The Homestead, Hot Springs, Va.

May 11-13, 1949—

National Industrial Sand Association, Annual Meeting, The Homestead, Hot Springs, Va.

June 27-July 1, 1949—

American Society for Testing Materials, 52nd Annual Meeting, Hotel Chalfonte-Haddon Hall, Atlantic City, N. J.

File Suit Over Defective Conversion of Machinery

RENO PUMICE CO., Reno, Nev., has filed suit to collect \$6954.76 because of defective conversion of machinery and resultant business loss. The suit was filed against operators of the Franks Foundry and Machine Shop. The plaintiffs claim that a manually-operated block machine was delivered to the defendants for changeover to hydraulic operation at the plaintiffs' expense, and when returned did not operate as promised, causing the Reno Pumice Co. considerable loss in wages, business and materials. The plaintiffs are seeking return of \$1240, the amount paid for the work, and \$84.34 for transportation of the machinery for conversion. They are also seeking \$5200 as claimed losses in sales during the time the converted machinery was inoperative, and \$439.42 for materials ruined through conversion and wages paid while the equipment was idle.

Fine Grinding Process

DR. A. W. FAHRENWALD, dean of the Idaho State School of Mines, has announced development of a new method of crushing ore to a fine powder for flotation, cyanidation or leaching recovery processes, and reports that one unit of horsepower in the new process produces two and a half times as much crushed ore as the ball mill and with only a fraction of the steel consumption. In the new process, rock is continuously subjected to pressure pulsations and the grinding is largely by the rock itself and not by steel surfaces. The immediate importance of this research is that it has demonstrated for the first time that new processes for effective fine grinding at low costs are possible, he said.

Construction in Canada

F. B. KILBOURN, president, Canada Cement Co., Ltd., Montreal, Quebec, at a meeting of stockholders, said prospects for a high volume of business during 1949 seem assured. "There is a large backlog of construction work, some of which is already under way, and there remains to be done a very great amount of power development both in Ontario and Quebec, the need for which is growing daily," he said.

Correction

THE ITEM on page 81 of the February, 1949, issue of ROCK PRODUCTS, entitled "World's Largest Crusher," describes an impact stone breaker, and the first sentence should have read "New Holland Manufacturing Co., Lancaster, Penn., has announced that it has begun production of what it claims to be the world's largest impact stone breaker."

NEWS

Preliminary Analysis of Johnson Bill

Executive Letter No. 458 to the National Ready Mixed Concrete Association and the National Sand and Gravel Association contains a preliminary analysis of the Johnson Bill to legalize delivered price selling and competitive freight absorption, as interpreted by Covington, Burling, Rublee, Acheson & Shorb. This analysis, in part, states:

"On January 5, 1949, Senator Johnson of Colorado, who in the Eighty-First Congress succeeds Senator Copehart as Chairman of the Subcommittee on Trade Policies, introduced a comprehensive bill designed to dissipate the confusion resulting from the Cement and Rigid Steel Conduit cases and to clarify the application of the Federal Trade Commission Act and the Robinson-Patman Act to delivered price selling and freight absorption carried on in the absence of conspiracy. The Johnson Bill reflects the tentative conclusions reached by the Subcommittee as the result of the so-called Copehart Committee hearings during November and December.

"In introducing it, Senator Johnson observed that it did not represent the final thinking of the committee and that criticism and suggestions would be sought. In all likelihood, hearings will be held in the immediate future on this proposal in the hope that it can be enacted in the present session of Congress.

"In general, the Johnson Bill offers the following clarifications: It reaffirms the rule that any pricing practice employed pursuant to an agreement among sellers shall be unlawful in violation of the Sherman Act and an 'unfair method of competition' under the Federal Trade Commission Act.

"It specifically provides that, in the absence of agreement among sellers, the use of a uniform delivered price, zone prices, or the equalization or absorption of freight shall not be deemed illegal. A specific exception to this rule is that any pricing practice which involves fraud, deception, or coercion will continue to be illegal.

"It gives the Federal Trade Commission broader remedial powers in cases of conspiracy or agreement involving delivered price selling by providing that in such cases the guilty parties may be required for a reasonable period of time to sell only f.o.b. factory or at delivered prices no higher than the f.o.b. price plus actual transportation costs. Even in such cases, however, the right to absorb freight is preserved.

"It provides that a seller is to have a complete defense to any charge of price discrimination where he can show that his lower price was given in good faith to meet competition. Of paramount importance, it specifies that 'competition may be met in good faith,

and in the absence of conspiracy, by the charging by any seller of lower prices to meet competition in any or all markets, regularly, customarily, or systematically, with or without prior announcement.'

"It seeks to eliminate the confusion as to the meaning of price by specifying that 'price' shall mean whatever is fixed by express or implied contract between the buyer and the seller. This is intended to eliminate the confusion resulting from the Trade Commission's insistence that in delivered price selling the 'price' for purposes of the Robinson-Patman Act is 'mill net' or 'net factory' realization.

"It requires that the proof that competition will be lessened or injured or prevented by a price discrimination must show a probable result which, as to buyers, materially threatens their ability to compete with other buyers in the resale of a commodity or in the sale of any product manufactured from that commodity, or as to sellers, a result which materially threatens the ability of any seller to continue to compete with other sellers.

"Lastly, the Johnson Bill seeks to make it clear that where all of the sellers in an industry use a delivered pricing system or regularly absorb freight to meet competition, and no conspiracy exists, the mere fact that the individual use of the practice results in identical or similar delivered prices or laid-down costs to all buyers at a particular point shall not make the selling practice illegal as an 'unfair method of competition.'

Civil Engineering Congress to be Held in Mexico

THE First International Civil Engineering Congress in Mexico will be held April 30 to May 7 at the Palace of Fine Arts, Mexico City. Two sessions are scheduled in addition to various tours of inspection to works either already built or under construction throughout the United States of Mexico, including irrigation structures, highways, railways, port and harbor works and oil industry installations. Two expositions will take place simultaneously with the Congress, featuring designs and models of civil engineering works and construction equipment. All Civil Engineering or similar societies throughout the world have been invited to participate. The organization has been formed by the Society of Professional Civil Engineers of Mexico under the auspices of the President of the United States of Mexico, and is sponsored by the National University of Mexico, National Politechnic Institute and Association of Engineers and Architects of Mexico.

Opens Gravel Plant

L. L. BAXTER is operating a sand and gravel plant near Beaver, Okla.

National Lime Association Annual Convention

THE 31ST ANNUAL CONVENTION of the National Lime Association will be held May 5-7 at The Homestead, Hot Springs, Va. Tentative list of topics to be presented and the speakers is as follows: General Manager's Report, Robert S. Boynton, general manager N.L.A.; "Legislative Aftermath of the Basing Point Decisions," Abram Myers, Legal Counsel, N.L.A.; "Lime and The Way of Land," George D. Scarseth, director of research, American Farm Research Association; "Neutralization of Acid Trade Wastes," C. J. Lewis, technical director, Warner Co.; "Lime-Asphalt Mixtures in Road Construction," Bernard E. Gray, general manager and chief engineer, Asphalt Institute; "Construction Industry," Melvin H. Baker, president, National Gypsum Co.; "Lime in Mortar Work," Dr. John Thornton, architectural engineer, Detroit-Edison Co.; Report on N.L.A. Agricultural Fellowship, Dr. F. G. Merkle, professor of soil technology, Pennsylvania State College; Report on N.L.A. Lime Stabilization Fellowship, Prof. K. B. Woods, professor of highway engineering, Purdue University; Report on N.L.A. Trade Wastes Fellowship, Dr. William Rudolfs, professor, Department of Water Supply and Sewage Disposal, Rutgers University; Report on N.L.A. Fundamental Research Fellowship, Prof. James A. Murray, associate professor of materials, Massachusetts Institute of Technology; and Research Observations, Prof. Walter C. Voss, head, department of building engineering and construction, Massachusetts Institute of Technology.

North Dakota Plans State Cement Plant

PRELIMINARY RESEARCH indicates that a successful cement plant could be operated at Colgrove Butte, between Richardson and Mott, N. D., Dr. Alexander Butt, director of the North Dakota research foundation, told a senate committee recently at a hearing on the feasibility of the state engaging in the cement manufacturing business. Dr. Burr outlined research which had been done on mineral deposits in the State and on the factors of the cement business which would have to be considered. He estimated cost of such a plant at \$3,600,000, and said annual operating cost would be about \$1,149,000. There is said to be sufficient material available at Colgrove Butte, of a quality which can be upgraded to produce portland cement, to run a plant producing 400,000 bbl. annually for 32 years. It was pointed out that the state used 875,000 bbl. of cement during the first 11 months of last year.

HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Sand Blending

AT A WESTERN OPERATION, dry sand is taken off through the outer jacket of a rotary screen following the sec-



Sand from outer jacket of rotary screen goes through three quadrant-type gates to belt conveyor

ondary crusher, and goes through three quadrant-type gates to a belt serving the dry sand plant. A hopper has been set up under the rotary screen, designed so that all or a part of this dry sand can be passed to the wet sand plant. This is accomplished by leaving the quadrant gates closed. The small hopper fills up and overflows to a bucket elevator which delivers to the wet section.

At this operation the rotary screen has a single $\frac{1}{8}$ -in. slotted outer jacket,

but this idea should be useful for making three sizes of sand and then blending them to the belt to meet desired specifications.

Lubricant Handling

IN THE HANDLING of lubricants there are any number of profit savers that should be kept in mind. Where a large volume of lubricants is used, a central oil storage house, set apart from the main plant, is best. Storage on wood floors should be avoided, as wood soaks up oil and grease from handling and becomes a fire hazard. Oil drums should be kept on end and checked frequently to see that no water can get into them, and suitable containers should be provided to catch drippings. Bungs and seals should be kept tightly closed to avoid moisture and other contamination, and bung and drum seal wrenches should be kept handy for this purpose.

Lubricants are always of more value when fresh, and it is advisable to store them only slightly in excess of the amount needed. Large stocks also invite contamination and waste in use. Monthly records should be kept for accurate control in storage and in use. Regular clean-up routines should be practised, particularly following a regular lubrication job. The use of lint-shedding rags as wiper clothes should be avoided, as lint, when lodged in bearings or oil circulation mediums, will clog and cause damage.

Reliable fire fighting equipment, including sand boxes, should be kept

close at hand and tested regularly. However, sand should be kept away from oil containers as it is a damaging abrasive when suspended in lubricants of any kind. Oil-soaked clothes should be placed in covered metal containers, and washed before being used again.

Grease Racks

A FLEET of approximately 75 trucks are constantly on the move at the Red Road plant of Maule Industries,



Grease rack for truck maintenance

Miami, Fla. The company has a block plant and asphalt plant there, and processes crushed stone at a rate of around 6000 t.p.d. Servicing of such a large truck fleet is a constant job, and is made easier with the use of an elevated rack, as illustrated. The rack is mainly of re-inforced concrete construction. Lines are available for washing and greasing all parts.

Rotary Rinse Screen

AT THE KERN ROCK Co., sand and gravel operation near Bakersfield, Calif., most of the aggregate is hauled in large capacity, company-owned trucks using Autocar tractors and Fruehauf trailers (See ROCK PRODUCTS, March, 1947). Recently the company installed a rotary rinsing screen just ahead of the truck-loading point so that the coarse aggregate can be given a final cleaning. The older tunnel belt discharges its load to a shorter inclined belt which delivers to a Gilbert revolving screen. Trucks can load direct from the tunnel belt (sand and the finer sizes), or, from the revolving screen (coarse aggregates). A 5-hp. Westinghouse motor drives the final loading belt. The plant employs an 18- x 36-in. Farrell-Bacon jaw crusher and Symons cone crushers, all of which are mounted on welded steel structural units.



Conveyor for truck loading of aggregate. Sand and finer sizes are loaded at "A." Coarse aggregate is given final rinse and loaded at "B."

Yard Crane Improvements

THE YARD CRANE illustrated here-with gave trouble to the maintenance staff since casual operators tended to take liberties with it that ordinarily would not be tolerated in an average shop. The frequent use of "side pulls" brought the hoist cables into contact with the live feeder, or control wires, and the resultant arcing meant the replacement of many hoist cables, and trolley wires as well.

To end this arcing, fenders, built of angle stock, were bolted and welded in place near the vulnerable trolley wires. A roof was added to keep rains from ruining the motor insulation, as well as that of the trolley wire assemblies and current collectors.

Outstanding feature of improvements made is an angle iron stage fastened just below the control cabinet which facilitates the job of adjusting the many relays and limit switches contained therein. If necessary, one man can manipulate the pendant controller from the stage, ride the crane in any direction, and observe the action of the relays for any final adjustment required. This of course was impossible with the old straight-ladder method formerly used.

To prevent the chain or cable sling from coming off of the hoist hook at a critical moment, the throat of the hook is closed with a spring-actuated latch. It is opened by push button.

Operator's Station

AGGREGATES for the ready-mixed concrete plant, block plant, or for direct marketing at an operation in Nebraska, are drawn from ground storage piles over a reclaiming tunnel. The aggregates are placed on the pile by several belt conveyors as shown in the illustration. Alongside of the reclaiming tunnel is a neat brick structure from which the reclaiming operation can be controlled. The structure protects the operator from inclement weather, yet enables him to see all phases of the operation with little effort.



In inclement weather, operator can control reclaiming operation from the brick housing



Improved yard crane features stage below control cabinet to aid job of adjusting relays and switches therein

Fluid Drive for Conveyor

A LINK-BELT Type "FDB" open-coupled fluid drive has been applied to a washing and dewatering flight conveyor at the Warner Co.'s VanSciver plant, Tullytown, Penn. The drive, mounted on a welded steel base plate to assure accuracy of alignment, starts the conveyor smoothly, without noticeable vibration, while a second conveyor equipped with ordinary motor drive was said to have started with a jerk and continue to operate in that manner. It is expected that with the vibration taken out of the operation, a substantial amount of money will be saved in repair bills.

Rubber Hose for Diesel Fuel Injection System

B. F. GOODRICH CO. reports the use of rubber hydraulic control hose on the fuel injection systems of large diesel-powered trucks. The hose is said to resist the action of the diesel fuels, and replaces copper or flexible metallic tubing ordinarily used for this purpose. The latter sometimes has the disadvantage of breaking off behind the couplings, due to vibration.

Spill-Out Gates

CONCRETE or other types of silos for storage of aggregate that rest on the ground usually have a reclaiming tunnel under them for recovery of contents. At an operation in the East, however, where the parent company had three large ready mix plants in operation, spill-out "gates" at the base

of the silos were used for aggregate recovery so that trucks could load directly from the silos. The spill-out "gates" simply are openings at the base of the silos. No actual gates are used as the rock itself seals off these openings.



Spill-out gates on silos

New Machinery

ROCK
PRODUCTS

Adds to Materials Handling Line

R. G. LETOURNEAU, INC., Peoria, Ill., has announced three new additions to its line of earthmoving and

features fingertip electric control, positive power steer, Tournamatic differential, more flotation, and sure-footed traction, according to the manufacturer. All three new units are interchangeable with the same 240-hp. two-wheel prime mover.



Top: Rear dump wagon with 41-cu. yd. capacity. Bottom: Unit for bottom-dump hauling has 27-cu. yd. capacity

materials handling equipment: the E-35 Tournahopper, the E-40 Tournarocker, and the E-25 Carryall Scraper.

The Tournahopper, used for bottom-dump hauling, is a 27-cu. yd., or 35-ton capacity unit, which travels at speeds up to 30 m.p.h. It is powered by a 240-hp. two-wheel prime mover, and has multiple-disc 4-wheel air brakes which provide 5135 sq. in. of braking surface. Other features listed by the manufacturer are a 10- x 10-ft. bowl for fast loading; ability to make a 90 deg. turn; 51 percent weight distribution on drive tires for extra traction; a 240-hp. engine; 30- x 33 tapered bead tires; and an exclusive dumping action which permits doors, operating in a manner similar to a clamshell, to be opened to any desired width.

The Tournarocker, a rear dump wagon, also is powered by a 240-hp. two-wheel prime mover. It has a 41-cu. yd. capacity and rear dump which is multi-cable controlled by an electric motor which tips the body beyond a vertical position for fast dumping. The unit which stands 12-ft. high and has a 16-ft., 8-in. x 10-ft. body, can make a 90 deg. turn, and can turn in a 18-ft. radius, the company states.

The Carryall Scraper, also powered by a 240-hp. two-wheel prime mover,

Off-the-road Tire

COOPER TIRE & RUBBER CO., Findlay, Ohio, has added the Lugger Traction Tread to its heavy-duty truck tire line. On-the-job tests have proved

Extra Large Classifier

THE DEISTER CONCENTRATOR CO., Fort Wayne, Ind., has announced development of the Concenco Super-Sorter, a giant classifier, for hydraulic classification of feed in applications hitherto considered commercially impossible in the coal, sand, phosphate and similar industries, a release states. Combined with the SuperDuty Coal Washing Table, the unit is said to recover materials in the extreme fine range previously wasted, with maximum removal of impurities. The unit will be on exhibit at the 1949 Coal Convention and Exposition, May 9-12, Cleveland, Ohio.

Aggregate Washing Plant

PIONEER ENGINEERING WORKS, INC., Minneapolis, Minn., has re-designed its 305-W aggregate washing plant. Advantages of the improved unit listed by the company are that the unit makes three sizes of rock and two of sand; scrubs as it cleans and washes; has a capacity of 50-75 cu. yd. per hr.; is of simple design and has simple drives; screens may be readily changed; is equipped with a mechanical feeder; requires one-man operation; and is semi-portable. The plant uses 300-500 g.p.m. of water, and requires 35 hp. to operate.



Off-the-road tire

the ability of the tire to reduce tire costs for operators engaged in strip-mining, quarrying and earth moving services of various types, according to the manufacturer. Present production has been concentrated on sizes 8.25-20, 9.00-20 and 10.00-20 in 12 and 14 ply ratings; however, additional sizes are being completed.



Details of material flow through re-designed aggregate washing plant

NEW MACHINERY

Drag Scraper Machine

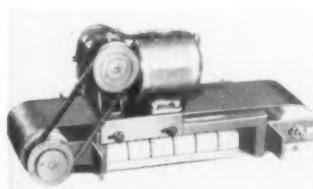
SAUERMAN BROS., INC., Chicago, Ill., has introduced a new series of power drag scraper machines in sizes from $\frac{1}{2}$ to 4 cu. yd., said to be specially suited to the excavation of hard-packed gravel. Known as Sauerman Rapid-Shifting Scraper Machines, the new units have been designed to give the operator, stationed at the scraper hoist, complete automatic control of shifting the tail end of the machine. This permits the operator to spot the scraper bucket instantly wherever he wishes, thus saving time and assuring better results when excavating non-caving materials or handling any work requiring constant shifting of the line of travel of the bucket, according to the manufacturer.

The feature of the machine is the three-drum hoist and elevated tail bridle assembly. A bridle cable is stretched between two tail towers, and on the cable a bridle frame for the tail block rides. The third drum of the hoist moves the bridle frame in one direction, the pull of the outhaul cable pulls it in the opposite direction, and the drum brake holds it positioned as desired. Each machine is furnished with a gasoline, diesel or electric driven, three drum, roller-bearing hoist. Standard operating spans run from 200 to 400 ft.

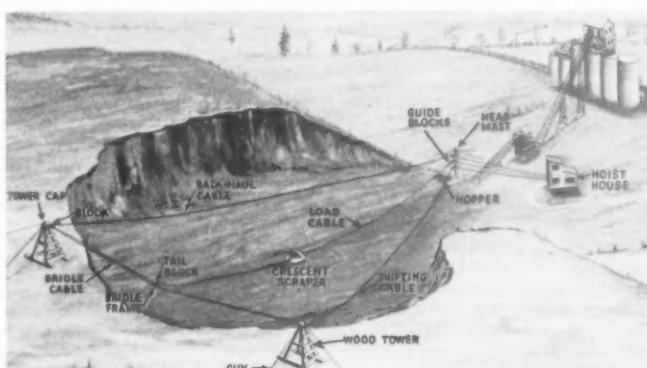
Self-Cleaning Magnet

DINGS MAGNETIC SEPARATOR Co., Milwaukee, Wis., announces that it has achieved completely automatic separation of magnetic and non-magnetic materials with an Alnico plate magnet and self-cleaning perma-plate. This permanent non-electric magnet unit is designed to provide moderately priced automatic protection for crushers, grinders, pulverizers and other machinery susceptible to tramp iron damage; to remove contaminating iron from such materials as sand, fertilizer, ceramics, etc.; and to prevent fires and explosions caused by tramp iron sparks in dust laden atmospheres. It can be installed over conveyor belts, spouts or chutes:

The unit consists of a heavy duty perma-plate magnet and a motor-driven endless cross belt. The magnet's force attracts and holds tramp iron to the underside of the cross belt,



Self-cleaning magnet



Drag scraper machine set up to excavate a deposit of non-caving material and convey material to crusher

which carries it to the side beyond the influence of the magnetic field, at which point it is discharged. The perma-plate is said to be equally effective with wet or dry materials, and can itself be completely submerged.

Spectacle-Type Goggle

WATCHEMOKET OPTICAL CO., INC., Providence, R. I., has made available the Watchemoket Eye Savers Tuc-



Spectacle-type goggle

Away model which has a new semi-cup lens design, said to afford the wearer 92 to 96 percent protection by providing full protection at the sides and bottom and leaving a narrow opening only at the brow to eliminate fogging. Shatterproof lenses are available in three shades of green and clear. The frame is plastic.

Speaker Circuit For Noisy Locations

EXECUTONE, INC., New York, N. Y., is producing an "intercom" circuit which was developed in order to answer paged messages from high noise level areas clearly and intelligibly. The new circuit combines the coordinated operation of a Trumpet-type paging reproducer and two-way staff station for use in either intercommunication or sound systems. In paging a person, the message is reproduced at high volume through the trumpet station.

To reply, the person called depresses a lever on the nearest conveniently located staff station. The trumpet is automatically cut out and two-way conversation at normal voice level can then be carried on. Before, when replies were made through a two-way trumpet reproducer in a noisy location, the trumpet would pick up all shop noises. Constructed of heavy metal, the units are built to withstand rough usage.

Two-Cycle Diesel Engine

THE HARNISCHFEGER CORP., Port Washington, Wis., has developed the P&H Diesel Power Unit, a diesel engine operating on the 2-cycle principle and said to combine the advantages of medium and high crankshaft speeds, satisfactory piston speeds, and an overall lighter weight unit. Other features claimed are interchangeability of parts; and cylinders, each of which is an independent, fully water-jacketed assembled unit providing a great saving in time when maintenance is required. The engines have a bore of 4.5 in., a stroke of 5.5 in. and a displacement of 87.5 in. per cylinder. All pins and journals are drilled for continuous pressure lubrication. The camshaft also is a heat treated alloy steel forging.

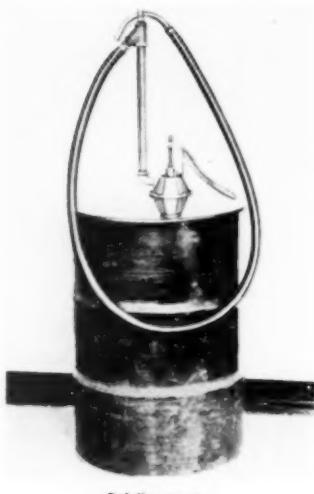


Two-cycle diesel engine

NEW MACHINERY

Refueling Pump

GENERAL SCIENTIFIC EQUIPMENT Co., Philadelphia, Penn., announces the No. 700-B refueling pump, featuring a special nylon cord, neoprene



Refueling pump

coated diaphragm which is said to have extra strength and stand up under gasoline and all motor oils. The pump is self-priming and has an automatic drainback principle that permits draining of hose and pump back into the tank. The lower casting is threaded for 1½- and 2-in. pipe. The hose is approximately 8 ft. and has a static wire to lessen fire hazard. Pump capacity is approximately 7 g.p.m.

Valve Bag

ARKELL AND SMITHS, Canajoharie, N. Y., has announced the Shur-Close valve bag which is said to step up filling operations by approximately one bag per min. over conventional bags. The Shur-Close sleeve permits faster flow of the material being packed, prevents sifting, and closes tightly, thus eliminating waste from seeping, according to the manufacturer. The valve is adaptable to multiwall bags of any number of plies, and may be filled on all standard filling machines.

Flame Failure Safeguard

COMBUSTION CONTROL CORP., Cambridge, Mass., announces a system for supervising both pilot gas flame and main oil flame of fully automatic oil burners as a protective measure against explosions caused by flame failure in industrial oil burner installations. An electronic flame rod "feels" the gas pilot flame. If the flame is unsuitable for proper ignition,

or out, the flame rod signals this condition to a programming control and the burner shuts down before the main oil valve has opened. With proper ignition, the main oil valve opens and the oil flame is monitored by a photoelectric scanner. A programming control provides setting of both oil valve delay and post ignition periods. Timing is accomplished through a synchronous motor.

Hard Surfacing Electrode

LINCOLN ELECTRIC CO., Cleveland, Ohio, is producing two electrodes of the coated tubular type for depositing super-abrasion resisting surfaces of weld metal. Tubular electrodes are steel tubes in which hard surfacing alloy in a concentrated form is contained. The alloy is deposited into the molten crater where it is either bonded into an iron alloy matrix or alloyed by the heat of the arc with the base metal to create the final hard surfacing alloy. Tungweld-C contains coarse particles of tungsten carbide in the tube, and is recommended for surfacing earth cutting tools. Tungweld-F contains fine particles of tungsten carbide and is recommended for mixing blades, dredge cutter blades, tool joints, etc. Both electrodes are available in 14-in. lengths in the 1/4-in. size.

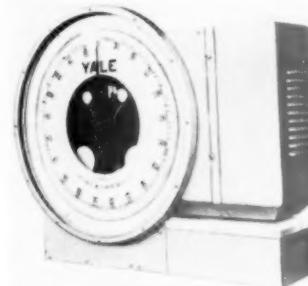
Front-End Loader

MEILI-BLUMBERG CORP., New Holstein, Wis., has announced an improved front-end loader for graders and maintainers. Operation of the loader is independent of grader blade, scarifier or leaning wheels, and the unit is said to be effective for handling materials from stock piles. It has a 1/2-cu. yd. bucket which, when in dumping

position, has a clearance of 8 ft., 6 in. A single lever at the operator's seat provides remote control of all loader action.

Scale Weight Printer

THE YALE & TOWNE MFG. CO., Philadelphia, Penn., has developed a new type of weight printer, which is being offered as a part of Yale Load King



Scale weight printer

Industrial Scales. The new unit prints actual weights in numerals 9/32 in. high, without additional calculation, according to the manufacturer, and various weights in a series can be identified by printing opposite the recorded weight from one to eight symbols, numerals or letters.

The weight printer which can be adjusted to take tickets from 3 x 5 in. up to 8 1/2 x 11 in. with one to four copies, is actuated by a depressing bar directly beneath the ticket slot. Also listed by the company is ability of the unit to print beyond the full capacity of the dial in the event of careless or accidental operation of the printer with the pointer beyond the last graduation.

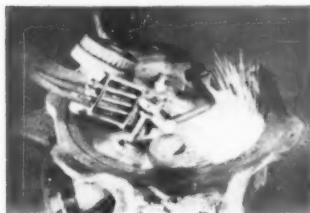


Front-end loader with 1/2-cu. yd. bucket

NEW MACHINERY

Wear-Resisting Process

BEDFORD GEAR AND MACHINE PRODUCTS, INC., Bedford, Ohio, has extended its services to include a precision metallizing process suitable



Metallizing process renews worn parts

for building a hard wear-resisting surface on almost any metal part. Worn bearing surfaces, shafts, concrete forms and many other parts can be metallized and re-machined to original tolerances for re-use at minimum cost, according to the company. In addition to the applications listed, this process is being used to repair blow holes in castings, provide a corrosion-resistant lining to plating tanks, make stainless steel overlay on rolls of various types, and to change or repair the contours of molds. The process is said to produce wearing surfaces having a hardness of up to Rockwell 68 C.

Truck-Mounted Compressor

DAVEY COMPRESSOR CO., Kent, Ohio, has announced a new and improved 1949 model 160 c.f.m. "Auto-Air" (truck-mounted) compressor. The unit is driven direct from the truck engine through a Davey P-85 heavy duty power take-off, thus eliminating the need for a separate driving engine, according to the manufacturer, and is suitable for mounting directly on the truck chassis or on a platform base.

The compressor is of the V-type

with three low pressure cylinders and one high pressure cylinder. It is 46 in. long and occupies about one-third of the truck body space. Width is 67 in. and height is 5 in. The unit, including the take-off, weighs 1600 lb.

Truck Mounted Crane

WAYNE CRANE DIVISION, American Steel Dredge Co., Inc., Fort Wayne, Ind., has announced a new $\frac{1}{2}$ -cu. yd., 10-ton truck-mounted crane and ex-



Truck-mounted $\frac{1}{2}$ -cu. yd. crane

Magnetic Pulley

STEARNS MAGNETIC MFG. CO., Milwaukee, Wis., is producing a permanent magnetic pulley which incorporates a special design of Alnico metal poles, self-energized and requiring no electric current. Applicable for automatic removal of tramp iron from materials, separation of magnetic and non-magnetic products, and for reclaiming secondary metals, the unit has been designed for uniform high magnetic strength over the entire face of the pulley, the manufacturer states. Because no wiring or electrical connections are needed, the pulley can be operated under varying atmospheric and temperature conditions. Over 50 sizes are available from 10 in. in dia. by 12 in. in width to 30 x 60 in.

Reciprocating Plate Feeder

LIPPmann ENGINEER WORKS, Milwaukee, Wis., has developed a new reciprocating plate feeder with anti-



Heavy-duty plate feeder

friction bearings which has positive feed control through an adjustable eccentric. The anti-friction bearings are said to provide true-running, long-life efficiency. The unit is of heavy plate construction.

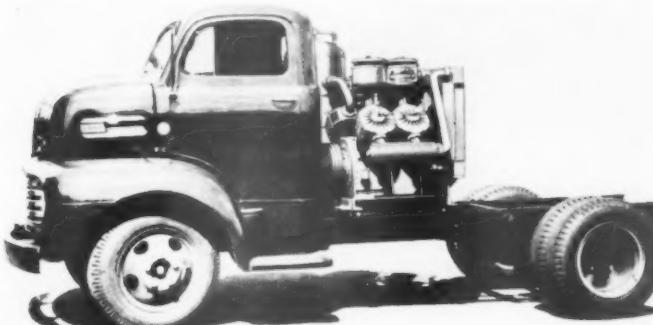
cavator, known as the Model 44 Corsair. The machine travels at truck speeds, swings at $5\frac{1}{2}$ r.p.m. and is said to be convertible to all crane and shovel attachments.

The 6-wheel tandem-type carrier is of 16-in., 45-lb., steel "I" beam construction. Outrigger tubes are integral with the frame, one pair ahead of the front wheels and one pair behind the rear wheels, to provide maximum rigidity and stability. Other features listed by the company are improved boom clearance and visibility, achieved by an offset, one-man cab and tapered frame ends; an auxiliary transmission providing ten forward speeds and two reverse; and a 6-cylinder gasoline engine which develops 105 hp. at 3200 r.p.m.

The crane features include four 20-in. clutches, enclosed gears running in oil, and a worm-driven boom hoist. Oversized shafts mounted on rigid antifriction bearings are said to reduce wear and upkeep costs. Safety features include a full-vision cab, boom snubbers, and a spring-loaded boom check brake. The crane is powered by an 8-cylinder gasoline engine which develops 62 hp. at 1800 r.p.m.

Centrifugal Fan

WESTINGHOUSE ELECTRIC CORP., Sturtevant Div., Hyde Park, Mass., announces that its Siliventvane type centrifugal fan has been re-designed for greater efficiency in industrial ventilating systems, reaching a static efficiency of 80 percent through changes in the fan's blading, wheel, inlet, back plate and scroll. The new Design 10 Siliventvane will be available in 23 sizes, with wheels ranging from 1-9 ft. in dia. The largest model, standing nearly 18 ft. high, will be capable of moving 480,000 cu. ft. of air per min., the manufacturer states.



Truck-mounted compressor

Record Attendance At New York

Specifications, safety, labor relations and plant operation discussed by National Sand and Gravel Association

REGISTRATION was in excess of 1000 at the thirty-third annual convention of the National Sand and Gravel Association and the ninetieth annual meeting of the National Ready Mixed Concrete Association, held the week of February 14 at the Hotel New Yorker, New York City. This was the second highest attendance in history and surpassed by far any previous conventions held by the two associations without benefit of machinery expositions. Membership in the two associations combined increased very substantially during 1948, and there is a growing endorsement of the informal types of meetings sponsored.

The next machinery exposition will be held at the Stevens hotel in Chicago, Ill., near the end of January in 1950, when these two associations will hold their annual conventions in conjunction with the National Crushed Stone Association and, according to established policy, the exposition will be held every other year thereafter. As pointed out, in discussion of meeting places, the three associations have outgrown the ability of all other hotels to accommodate the machinery exposition, so the time and place for the 1952 convention and exposition have not yet been determined. Chicago, Ill., or Cleveland, Ohio, likely will be selected. The National Sand and Gravel Association and the National Ready Mixed Concrete Association will hold their 1951 annual conventions in New Orleans, La., and will meet in San Francisco, Calif., in 1953.

The New York conventions were packed into three days instead of the usual four, following a day set aside for meetings of the boards of directors, and followed the pattern of recent years in emphasizing member participation in informal discussion. Most of the papers formally presented were by members of the two organizations and the entire program was devoted to matters of everyday interest to the two industries.

Two Joint Sessions

There were no simultaneous sessions of the two associations, but two joint sessions were held, one of which was the opening meeting on the morning of February 15, and the other an afternoon session on the second day. However, there were separate sessions to consider special topics, and several committee meetings. Among the special meetings and sessions were a luncheon meeting for state and district association officials, a meeting of the committee on taxation, an evening open forum on employer-employee relations, an informal session on cost accounting problems, and an open forum on the design of concrete mixtures, and open meeting of the committee on operating problems, one for the committee on zoning, land rehabilitation, and a luncheon meeting of members of the Ohio Ready Mixed Concrete Association. Associate members were hosts at the traditional reception, which was the only scheduled event of entertainment.

Principal subjects covered in the general sessions included safety, results of air-entrained concrete, bituminous road construction, specifications that present difficult plant operation problems, the construction program and specifications of the Corps of Engineers, highway planning, construction outlook and requirements for concrete aggregates for highway construction. Some of the foregoing topics were considered in joint sessions of the two associations.

Reports of subjects particularly for producers of ready-mixed concrete, and some of the topics considered in joint sessions, are printed in the Concrete Products Section of this issue, wherein the National Ready Mixed Concrete Association convention reports are published.

Presiding Officers

Albert R. Shiely, member of the boards of directors of both associations, was presiding officer for the opening joint session, February 15, which heard the presidential addresses, the reports of the executive secretary and the director of engineering, and at which the safety trophies were presented to the winners of the industry-sponsored safety competition.

Thomas E. Popplewell, president of the National Sand and Gravel Association, presided over the second session which considered air entrainment, aggregates for bituminous road construction and difficult specifications in their relation to plant operation.

Harris N. Snyder, vice-president of the N.S.G.A., presided over a meeting devoted to consideration of the Corps of Engineers' construction program, highway planning and requirements, and construction. The final session for sand and gravel producers, under the chairmanship of Charles E. Brady, considered aggregates requirements for civil works construction and for highway construction, and concluded with the election of officers. Past president Robert Mitchell presided at a joint luncheon of the two associations.

Ladies' Entertainment

The program of entertainment for the ladies was under the chairmanship of Mrs. C. Gray (Ready Mixed Concrete Co.), Indianapolis, Ind. Sched-



Three past presidents of N.S.G.A., left to right, are: Alex Dann, Pittsburgh, Penn., V. O. Johnston, Lincoln, Ill., and R. C. Fletcher, Des Moines, Iowa.

SAND AND GRAVEL

uled events included a ladies' tea on the opening day and a bus trip and tour of the United Nations at Lake Success with luncheon at the United Nations Cafeteria. There were some 140 ladies registered.

Officers

Thomas E. Popplewell, Fort Worth Sand and Gravel Co., Fort Worth, Tex., was re-elected president of the National Sand and Gravel Association; H. N. Snyder, The Buffalo Slag Co., N. Y., was re-elected vice-president; and A. R. Shiel, Guaranteed Concrete Co., St. Paul, Minn., was re-elected secretary-treasurer.

W. Agnew Bliss, Dravo Corp., Pittsburgh, Penn., and Robert H. Baker, Dixie Sand and Gravel Corp., Chattanooga, Tenn., were re-elected to the executive committee. Newly elected to the executive committee replacing George W. Renwick and Eric W. Ryberg, were R. E. Weaver, Lincoln Sand and Gravel Co., Lincoln, Ill., and John W. Murphy, Union Sand and Gravel Co., Spokane, Wash.

Members of the board of directors were: H. D. Bellamy, Concrete Materials Co., Waterloo, Iowa; C. A. Barinowski, Montgomery Gravel Co., Birmingham, Ala.; Charles E. Brady*, lessees of B. V. Hedrick Gravel and Sand Co., Lilesville, N. C.; Edmond F. Brovelli, Basalt Rock Co., Inc., Napa, Calif.; H. P. Caldwell, Ohio River Sand Co., Louisville, Ky.; F. J. Cloud, W. R. Bonsal Co., Hamlet, N. C.; A. E. Conover**, Robins Conveyors Division, Hewitt-Robins, Inc., New York, N. Y.; Fred P. Curtiss, Lyman-Richey Sand and Gravel Corp., Omaha, Neb.; Clarence C. Deal, Deal Gravel Co., Elkhart, Ind.; C. S. Dickson, Standard Sand and Gravel Co.,



Left to right are President T. E. Popplewell of N.S.G.A., engineering director Stanton Walker, retiring President C. "Dolly" Gray of N.R.M.C.A., and Executive Secretary V. P. Ahearn

Wheeling, W. Va.; William J. Doyle, Jr., Tulsa Sand Co., Tulsa, Okla.; Floyd C. Fuller*, The Portsmouth Sand and Gravel Co., Portsmouth, Ohio; E. P. Gemmer, Texas Construction Material Co., Houston, Tex.; Paul C. Graham, Graham Brothers, Inc., El Monte, Calif.; Wm. Edward Hole, American Aggregates Corp., Greenville, Ohio; D. W. Kelley, Arizona Sand and Rock Co., Phoenix, Ariz.; M. G. Kerr, American Aggregates Corp., Detroit, Mich.; Wayne W. King**, The W. S. Tyler Co., Baltimore, Md.; J. D. Lewis, American Sand and Gravel Co., Hattiesburg, Miss.; L. T. McCourt*, Greenville Sand and Gravel Co., Memphis, Tenn.; Daniel J. Miller, Portland Sand and Gravel Co., Portland, Penn.; H. F. G. Pelsue, Metropolitan Sand and Gravel Corp., Port Washington, N. Y.; J. P. Eyre Price*, Wyoming Sand and Stone Co., Scranton, Penn.; John Prince, Stewart Sand and Material Co., Kansas City, Mo.; George W. Renwick, Chicago Gravel Co., Chicago, Ill.; D. D. Reynolds, Boston Sand and Gravel Co., Cambridge, Mass.; G. G. Robinson, Consolidated Sand and Gravel Ltd., Toronto, Ontario, Canada; Nathan C. Rockwood***, Naperville, Ill.; Eric W. Ryberg***, Utah Sand and Gravel Products Corp., Salt Lake City, Utah; A. H. Smith, Branchville, Md.; Stephen Stepanian*, The Arrow Sand and Gravel Co., Columbus, Ohio.

Eric W. Ryberg, Salt Lake City, Utah, was elected an honorary member of the Board of Directors of the National Sand and Gravel Association and a wire was sent him expressing the association's sincere wishes for speedy recovery from his illness.

Presidential Address

Both presidential addresses were given at the opening joint session of the two associations. The address by C. "Dolly" Gray, president of the National Ready Mixed Concrete Association, is summarized in the Concrete Products section of this issue.

T. E. Popplewell, president of the



J. R. Gilbert, chief, Concrete Branch, Corps of Engineers

National Sand and Gravel Association, in his address, expressed pleasure at the large attendance and urged maximum floor discussion in explaining the program. He expressed his thanks to the executive committee, the board of directors, and those who served on the various committees, for the co-operation they had given him in 1948, and, on behalf of the association, thanked Dr. H. C. Byrd, president of the University of Maryland, and Professor S. S. Steinberg, Dean of the College of Engineering, for their fine co-operation in connection with the research foundation. The university is completing new quarters for the association's laboratory.

Mr. Popplewell reported that the association has been busy and is in sound financial position. Twelve new members have been added whereas 11 were lost during 1948, some of which went out of business.

In commenting on accomplishments during 1948, he mentioned the moving of the Washington office and listed various activities including those in connection with freight rate increases, car shortages, cement shortages, labor and management relations, specification problems and wage rate studies in the industry. He also mentioned the association's appearance before the National Security Resources Board and the short course for industry technicians conducted at the University of Maryland. Mr. Popplewell was eloquent in his praise of the Washington staff and mentioned additions thereto.

In telling of executive secretary V. P. Ahearn's special accomplishments, he mentioned his appointment as chairman of the Business Research Advisory Committee by the Commissioner of Labor Statistics, U. S. Department of Labor. He also mentioned that Mr. Ahearn is executive secretary of the President's Conference on Industrial Safety and that he had been nominated by the U. S. Chamber of

*Member at Large

**Representative of Manufacturers Division

***Honorary Member

SAND AND GRAVEL

Commerce and the N.A.M. and has been appointed by the president to serve on the Building Civil Engineering and Public Works Committee of the International Labor Organization which met in Rome on March 15.

In telling of the accomplishments of director of engineering, Stanton Walker, he said ". . . he is certainly kept busy keeping the specifications within the limits of our materials . . ." He mentioned his participation on seven committees of A.S.T.M., and on seven of the American Concrete Institute. Mr. Walker has also lectured in a short course for highway engineers at Michigan State College,

has continued to lecture in the course on concrete technology at Harvard, and held the short course at the University of Maryland.

Mr. Popplewell took issue with President Truman's proposals for legislation which would adversely affect industry, which he believes would be inflationary and place restrictions on free enterprise. He urged that members express their opposition to these proposals by writing their Congressmen, and that they assist the association's committee on percentage depletion in preparing its case for the industry.

Executive Secretary's Report

EXECUTIVE SECRETARY V. P. AHEARN, in his annual report to both associations, commented on a great number of industry problems and activities in connection with them which were taken in 1948. He discussed the outlook for business, federal legislation, labor relations, safety, sales agreements, wage studies, zoning, regional meetings that he has attended, car supply, railroad freight rates, the significance of the basing point decision in the cement industry and many other matters with which his office has been concerned. Much of his comment applied to both sand and gravel and ready-mixed concrete producers, so we make no attempt to segregate the topics according to industries, and summarize his remarks to both industries herein.

Financial condition of both associations is excellent. Membership in the

National Sand and Gravel Association has been maintained at its highest level despite the fact that some members have gone out of business. Membership in the National Ready Mixed Concrete Association has increased a great deal and comprises by far the largest list in history. Mr. Ahearn expressed appreciation to the memberships for their co-operation with his office and complimented chairman A. E. Conover and the Manufacturers Division for their co-operation and success in building membership of the Division. A. Levison, Blaw-Knox, also was cited for his activities in connection with the Truck Mixer Manufacturer's Bureau.

Mr. Ahearn commented briefly on exhibit plans for the January 23-27, 1950, meeting to be held at the Stevens hotel, Chicago, which location will provide three times as much floor area

for machinery display as has ever been made available before. The New Orleans convention in 1951 will be held in mid-February, the 1952 convention and exposition will be either in Chicago or Cleveland, Ohio, and San Francisco will be host to the associations in 1953. Expositions will be held in alternate years.

Mr. Ahearn's estimate of production of sand and gravel in 1948 was based on 1947 official figures. Total production in 1947 was 287,659,000 tons valued at \$216,869,000, representing an increase of 13 percent in quantity and 27 percent in value over 1946. Commercial production was 74 percent of the total, or 212,562,417 tons valued at \$182,371,368. Average value of commercial tonnage at the plant was 86c in 1947 compared with 77c in 1946. His guess was that production and value had increased 15 percent in 1948, indicating a total production in excess of 310,000,000 tons valued at about \$235,000,000. Estimates for ready-mixed concrete were based on reports from member companies, which produce 80 percent of the national volume. The entire industry produced 25,000,000 cu. yd. in 1948, according to his figures, with delivered value of approximately \$250,000,000 which figures are substantially over those for 1947. Thus, the two industries combined had a dollar volume in 1948 of one-half billion dollars.

Estimated construction volume of \$18,750,000,000 (Bureau of Labor Statistics) will be up slightly in 1949 but physical volume will be about the same as last year. Declines were predicted for residential building, industrial construction and farm con-



A. R. Shieley presents the ROCK PRODUCTS safety trophies in sand and gravel competition. On left, Charles F. Ogle receives his award. On right, V. P. Ahearn, left, looks on as J. M. Dowdy accepts his award.

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struction, to be offset by expected increases in public works. Highway construction will likely be at the highest level since 1939.

During 1948, the associations moved their offices to better quarters in Washington, D. C., and Mr. Ahearn acquired an assistant in Kenneth Tobin. His office published two year books in 1948, completed its preparatory work on cost accounting manuals, and published pamphlets covering new employer-employee relations for both industries to aid in working up sound collective bargaining policies. In commenting on collective bargaining, Mr. Ahearn said that unions respect employers who actually bargain collectively on the basis of authoritative advice.

In discussing the subject of safety and the safety contests, he said that the National Sand and Gravel Association is taking over the function of conducting the competition from the Bureau of Mines because participation has been inadequate. Participation in the safety competition for ready-mixed concrete producers also has been inadequate. Safety is good business, he said, in citing the trend upward in workmen's compensation rates and the growing tendency of the public to be more conscious of health and safety.

In discussing the development of sales agreements for the ready-mixed concrete industry, he stressed the need for salesmanship in 1949 to justify the product of the industry and the company in changing to a buyer's market. The sand and gravel industry must also become more sales conscious. The quarterly wage studies have disclosed valuable data for the guidance of the industries. Mr. Ahearn attended regional meetings in Atlanta, Chicago, New Orleans, Appleton, Wis., Boston, Kansas City, St. Louis, New York City, Miami, and the Wabash Valley in 1948. There will be more such meetings in 1949.

In his comments on car supply, he said that it has been brought out that conditions of cars are such that it costs a producer as much as \$5 to clean a car. Gondolas will be short in 1949, and the railroads have only 15,000 covered hoppers which serve the ready-mixed concrete industry. Federal aid for highways is \$450,000,000 for the fiscal years 1950 (July 1, 1949) and 1951.

The associations have been active in Wage and Hour Law legislation and the Taft-Hartley Law and will clarify new provisions after Congress has made its revisions. Actually, Mr. Ahearn said, the Taft-Hartley Law will be amended and not repealed. However, the amendments will provide less protection to industry from union abuses. The Lodge-McMahon Bill, a proposal to amend the Walsh-Healy Act, would require a 30-hr. guaranteed work week where contracts with the government exceed \$10,000. He



M. W. Clement, president, The Pennsylvania Railroad Co., left, was speaker at joint luncheon with chairman Robert Mitchell, center. On right is Col. M. E. Pearce of England who heads the English Aggregates Association

said that new legislation likely will be passed to clarify pricing methods, in referring to the ruling which outlawed basing point pricing. The associations have been co-operating with the National Security Resources Board in making plans for the industries' participation and guidance in event of another national emergency.

Mr. Ahearn was pleased at the record-breaking attendance. Eighteen of the 19 members of the N.R.M.C.A. board of directors were present at the meeting and eight of the nine living past presidents. The ninth is no longer in the industry. Of 30 members of the board of directors, N.S.G.A., 24 were present. Eleven of the 15 past presidents were at the convention.

Engineering Director's Report

Director of Engineering Stanton Walker gave a consolidated report on the engineering activities of the National Sand and Gravel Association and the National Ready Mixed Concrete Association, which we summarize herein.

He briefly referred to routine and continuing activities, among them being active representation of both industries in the various technical organizations such as A.S.T.M., A.C.I. and many others concerned with aggregates and concrete. Mr. Walker has been very active throughout 1948 in discussing concrete aggregate specifications with the Corps of Engineers. Laboratory researches have been continued at an active rate and, as he pointed out, would be summarized by Fred F. Bartel and D. L. Bloem in other sessions of the convention.

During 1948, 14 technical information letters were produced, seven for each association. Other publications prepared were one on "extending the fineness modulus," one on ballast, and

a third on the sampling and testing of ready-mixed concrete. The third Short Course at the University of Maryland had an attendance of 78 as compared with 36 and 31 for the previous meetings.

Mr. Walker commented at considerable length on the aggregates specifications of the Corps of Engineers, as revised, and which came to a head in the Chain of Rocks Lock project at St. Louis where high cost manufactured stone sand was required in lieu of Mississippi river sand.

In touching upon reasons for the rejection of the natural sand, he said that concrete made with it and the available limestone as coarse aggregate resisted freezing and thawing less well than concrete made from limestone coarse aggregate and stone sand from the same source, according to certain tests. This was true, he said, in spite of the fact that the Mississippi river sand and another coarse aggregate (a trap rock) gave excellent results. It has been suggested that the difficulty was due primarily to "difference in thermal characteristics of the sand and the stone." According to petrographic analysis, the presence of five percent of chert "composed of chalcedony" was indicated.

Because of the possible far-reaching consequences as a result of this decision, a special committee was appointed by President Popplewell to carry on discussions with the Chief of Engineers of the Corps of Engineers. The committee, under the chairmanship of John Prince, has met with General Wheeler and his staff, and, as a result, the "policy letter" of June 23 was drafted by General Wheeler.

Among excerpts quoted from the letter by Mr. Walker was the following: "—All members of your association in any locality who have sources

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Ed Munan and Harris Snyder, left and center respectively, of Buffalo, N. Y., with F. P. Spratten, Jr.

of natural concrete aggregates which they would like to have considered by the Corps of Engineers may request that the material from their sources be tested prior to the issuance of invitation for bids for any project in that locality."

Subsequent projects have not been sufficient to make clear how the newly-stated policies will work, according to Mr. Walker. A lock and dam near Morgantown, W. Va., was advertised with sources of natural sand approved for use with limestone but with no sources of gravel designated, he said, which would seem to make good the statement of General Wheeler that "thermal conductivity" was not controlling.

Subsequently, a survey was made of hydraulic structures in the Pittsburgh area, built of natural sand and gravel as aggregate, which revealed good as well as bad concrete. Mr. Walker has gone on record as stating that the largest proportion of the distress was due to factors other than soundness of aggregate. The Corps of Engineers believes otherwise.

Specifications for Monongahela Lock and Dam No. 2 as issued provide for the use of natural sand throughout the structure and for gravel in a portion of the structure which involves more than half the volume of concrete. On another large dam (Conemaugh on the Allegheny river) to be built, 6-in. top-size coarse aggregate is to be used and, according to Mr. Walker, various sources of natural sand will be designated as approved but no sources of gravel. Gravel is not available above 3 in., but it is understood that the possibility of using gravel up to 3-in. sizes in combination with coarser sizes of crushed stone might be considered.

These developments in specifications and the forthcoming move of the association's laboratory facilities to new quarters have resulted in a re-assessment of facilities and objectives for research. A special committee of the

two associations was appointed for the study which has resulted in decision to increase equipment facilities and the scope of the research program. Two additional graduate research fellowships at the University of Maryland have been authorized, one by the N.S.G.A. and one by the N.R.M.C.A., and notice of the availability of these opportunities has been sent to accredited engineering colleges.

Among the opportunities for research mentioned were chemical reactions between aggregates and cement, including the permissibility of using reactive aggregates with low alkali cements or, with a pozzolanic material; the thermal characteristics of aggregates; air entrainment, including its efficiency in improving the performance of questionable sand and certain coarse aggregates in concrete and related studies of strength, workability, bleeding, etc., and different air-entraining agents; aggregate grading and proportioning methods; test methods; and for the sand and gravel industry specifically, studies of the adhesion of asphalt to different aggregates and stability.

Miscellaneous researches might consider the qualities of various cements, performance of different aggregates and combinations in relation to different cements, the effects of soft particles and other questionable materials in aggregates, the relation of mixing time on the change in volume of concrete as it goes from a plastic state to a hardened state, aggregate attrition in concrete mixes, etc., etc.

In conclusion, Mr. Walker expressed his thanks to the membership and the boards of directors of both associations for their co-operation. He also acknowledged the increasing assistance being received from Messrs. Bartel, Bloem and Zeigler. His three assistants, according to Mr. Walker, are highly competent young engineers who are developing rapidly in the assumption of an increasing share of the responsibilities.

Manufacturer's Division

W. W. King, The W. S. Tyler Co., Cleveland, Ohio, was elected chairman of the Manufacturer's Division, succeeding A. E. Conover, Robins Conveyors Division, Hewitt-Robins, Inc., New York, N. Y., and L. C. Mosley, Marion Power Shovel Co., Marion, Ohio, was elected a vice-chairman to succeed Mr. King. Re-elected vice-chairmen were E. C. Anderson, Kensington Steel Co., Chicago, Ill.; Morgan R. Butler, Butler Bin Co., Waukesha, Wis.; C. O. Friend, Nordberg Manufacturing Co., Milwaukee, Wis.; R. V. Johnson, Simplicity Engineering Co., Durand, Mich.; and J. C. McLanahan, McLanahan & Stone Co., Hollidaysburg, Penn. R. McLean, Jaeger Machine Co., Columbus, Ohio, was elected to the board of directors to replace Mr. Mosley. W. W. King and A. E. Conover represent the Manufacturer's Division on the Board of Directors of the National Sand and Gravel Association.

Principal business of the annual meeting was discussion of future expositions beyond 1950 when the conventions will be held at Chicago's Stevens hotel. A resolution was passed that a suggestion be made to the board of directors of the N.S.G.A. that consideration be given to the possibility of holding the meetings of the N.S.G.A., N.R.M.C.A. and N.C.S.A. all in one week. The Division has a membership drive underway and has in mind conducting larger and better expositions in future years.

Meeting for Local Association Officials

A luncheon meeting for state and district association officials was held the day preceding the conventions, with about 12 in attendance. The meeting was informal. H. G. Feraud, secretary of the Southern California Rock Products Association, was elected temporary chairman and Claude L. Clark, secretary, Ohio Sand and Gravel Association, was elected secretary.

Frank L. Kelly, Colonial Sand and Stone Co., New York, N. Y., indicated that a local association might be organized and his main interest was to find out just what such a group could do for his company. Others also indicated a similar interest. Mr. Feraud gave a very interesting and informative account of what his association was doing in Southern California. His group is composed of 11 sand and gravel producers who are also ready-mixed concrete operators, and four companies which only produce ready-mixed concrete. This group however, represents by far, the principal production in the area. He said there were 26 other ready-mixed concrete producers in the area, most of whom were small, and only one non-member producer who could be called a large

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operator. The association serves an area with a population between 6 and 7 million people and produced 12 million tons of sand, gravel and crushed rock, and 2 million cu. yd. of ready-mixed concrete in 1948. Members in the association have 400 mixer trucks available.

Mr. Feraud told how his association was financed. The aggregates producers pay dues on a tonnage basis and ready-mixed concrete producers on a cubic yard basis. The rates charged per unit are sufficient to finance the work of the association and to leave a very comfortable bank balance. One important thing that has contributed to a smooth-functioning organization is that all money received is sent direct to a specified bank which assembles all data while keeping details confidential. The bank renders a report wherein the individual company tonnages are grouped into three geographical districts, and the total is the only tonnage data that is given to the members. Thus individual com-

pany tonnage reports are not made public. The bank then sends Mr. Feraud a single check for the monthly receipts. The speaker told how, through the association efforts, the number of sizes of aggregates that must be produced in the area was reduced from 30 to 12, and how valuable data were supplied each member regarding repair shop efficiency, and similar data relating to salesmen and office help. He said the association was going to contribute funds to help finance national research to the industry, and may hire a technical assistant for Mr. Feraud. He said that most of the truck mixers in his area were 4-cu. yd. units and that for the entire year the performance was $3\frac{3}{4}$ cu. yd. per hour per truck, for a yearly average.

Ray V. Warren, secretary, Ready Mixed Concrete Association of Pittsburgh, Penn., said there were 189 mixer trucks in the Pittsburgh area and that 500,000 cu. yd. of concrete were delivered in 1948.



Col. H. E. Peirce of England, left, and V. P. Ahearn

plants and (2) transportation. Each plant has a safety committee, of which the superintendent is chairman. The safety engineer meets with each committee at least once a month and every accident is discussed. Hazardous conditions, as observed, are also discussed and recommendations for corrections are made in writing and must be followed up by the safety engineer.

Each producing plant is entered in the National Sand and Gravel Association safety contest and since 1936, since the plants first entered the competition, the company has won four of the trophies awarded by ROCK PRODUCTS. As a special reward to the superintendent whose plant has won the previous year, he is given a trip to the annual convention to receive the trophy personally. The plant which won the last trophy last year is in a fast-growing suburban community where new residents have been inclined to regard the plant as a nuisance industry. The trophy was put on display in the lobby of the local Chamber of Commerce and a story appeared on the front page of the local newspaper. In another contest, a little white elephant is awarded each month to the operation having the most personal accidents which is placed on the superintendent's desk and a picture of the elephant is shown every month in "Consolidated Rock News" which goes to the home of every employee. The superintendents are anxious to keep the elephant moving.

In the program covering transportation, traffic accidents in addition to personal accidents must be considered. For the year 1935, the total truck fleet travelled slightly more than 1,600,000 miles with a frequency of 4.2 accidents per 100,000 miles. In 1948, mileage increased to 7,800,000 miles and the frequency rate was reduced to 1.53.

All the trucks are entered in a fleet safety contest sponsored by the greater Los Angeles chapter of the National Safety Council, and the concrete mixer fleet is entered in the contest by the

A Safety Program that Works

SAFETY was the principal subject covered in the opening general joint session of the N.S.G.A. and the N.R.M.C.A., following the addresses of the two presidents and the reports of the executive secretary and director of engineering.

Robert Mitchell, in a paper, "Safety Program of Consolidated Rock Products Co.," outlined the highlights of a safety program that is outstanding in the industry and which has brought results. Mr. Mitchell is president of

his company, which has its headquarters in Los Angeles, Calif., and operates plants throughout Los Angeles county.

In his introduction, Mr. Mitchell modestly said that he is far from satisfied with accomplishments thus far and that he could only hope, in his paper, to stimulate in top executives a desire to have a real safety program. He emphasized that a safety program, to be successful, must have the sincere and active support and participation of the chief executive. Leadership, he said, cannot be delegated but the authority to carry out a program can and should be delegated. Sporadic drives are not the answer, he said, in stressing the need for consistent day by day effort. Too many chief executives delay adoption of a safety program until after they first find that their insurance costs are increasing. In this regard, in emphasizing that accidents cost money, he said that the cost of an accident is included in the price that must be paid for insurance.

While the economies to a company in having a sound safety program are important he pointed out the value to the individual employee in terms of respect and pride in his company. Public good will is another consideration, he said, particularly to those who operate in urban areas. Plants which were formerly isolated now have neighbors moving near who often regard them as nuisances.

Consolidated Rock Products Co. has approximately 850 employees and has a full-time safety engineer who supervises all programs and co-ordinates all efforts. The program is divided in two parts, (1) production and distributing



E. P. Genner, Houston, Texas, board member, N.S.G.A.

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National Ready Mixed Concrete Association.

Since 1935, certificates of honor have been issued to drivers in recognition of their no-accident record. The cards are signed by the chief of police of Los Angeles and Mr. Mitchell. Lapel buttons are given for records of over four years of safe driving. Gold buttons are given to those who have had no accidents, and silver buttons to those who have been absolved of blame for unavoidable accidents. Certificates and buttons are presented at an annual breakfast.

The company's own driver's court is based on the idea that the men themselves participate in the analysis of accidents. The courts are held monthly and all drivers and garage mechanics are summoned to attend. Judges are the safety engineers, the transportation manager, division superintendent, mechanical superintendent and a representative of the insurance carrier. Responsibility is fixed by secret ballot.

The company has a health program and has group insurance for all employees which includes disability as well as death benefits. Health bulletins are posted at the plants and publicized in "Consolidated News." Every em-

ployee must have a physical examination when first employed. All executives, department heads and drivers are examined annually. Another organization that is active in the promotion of safety is the Consolidated Rock Management Club, composed of executives, superintendents and foremen.

In conclusion, Mr. Mitchell said that the pay-off of a good safety program is substantial money savings, increased efficiency, happier workers, public good will and general satisfaction.

Safety Awards

J. M. Dowdy, superintendent of the Memphis Gravel Plant, Marquette Cement Manufacturing Co., Memphis, Tenn., was presented the ROCK PRODUCTS safety trophy as the winner of the 1947 competition in the large plant competition. Charles F. Ogle, superintendent of the Crystal City, Mo., plant of Pittsburgh Plate Glass Co., received a similar trophy for winning the competition for plants that operated less than 100,000 man-hours in 1947. Both trophies are of high grade cast stone concrete with reproduction of the winning plants in colors.



Fred F. Bartel, left, and Delmar L. Bloom of the Washington engineering staff

coarse aggregate while only one sand was used in the study of the coarse aggregate. Tests were also conducted, he said, with five different cements, as well as a series of other tests to determine whether beneficial results in concrete were derived from the entrainment of air, or from other physical or chemical effects of the admixture used. He described in detail the procedures and conditions under which the various tests were conducted.

He showed six slides that summarized the results of the tests, three of which we include here as a part of the convention report. In each of the diagrams, data were plotted with cycles of freezing and thawing as abscissae and modulus of elasticity, expressed as a percentage of the value at start of freezing and thawing, as ordinates. A rapid reduction in modulus of elasticity indicates rapid deterioration of the concrete, while little change in that property indicates little or no deterioration, and little or no change in the flexural strength.

Summary of Five Aggregate, Air-Entraining Agent Tests

Mr. Bartel summarized the results of his tests by pointing out that, for the five sands studied which had service records from excellent to poor, and losses in salt soundness tests that ranged from low to high, that air-entrained concrete showed uniformly excellent resistance to freezing and thawing regardless of the sand used. Normal concrete, however, showed resistance to the tests of from poor to excellent depending on the sand used.

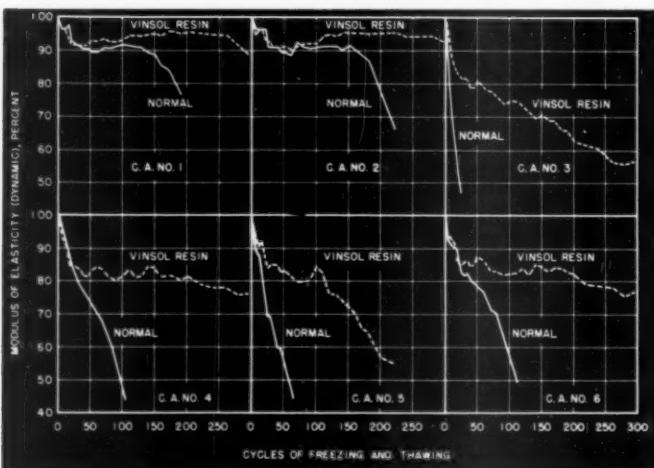
He said a similar summarization could be made for the coarse aggregate, but that not all the air-entrained concretes showed the same order of performance in the test, with some showing excellent resistance and others intermediate resistance. He said that, for coarse aggregate in general, each material must be studied separately to determine its resistance to freezing and thawing under air-entrainment conditions.

Tests on Air-Entrained Concrete

AT THE TUESDAY afternoon session of the National Sand and Gravel Association, Fred F. Bartel, assistant director of engineering, spoke on "Effect of Air Entrainment on Resistance to Freezing and Thawing of Concrete Made With Questionable Aggregates." In his paper, he summarized investigations carried out by

the association's research foundation at the University of Maryland.

The tests were made of normal and air-entrained concrete containing five sands ranging in soundness from excellent to poor, and six coarse aggregates. The tests were conducted independently of each other. The sands were used in combination with a single



Results of a test to show relation of modulus of elasticity change to cycles of freezing and thawing

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Regarding the five cements used, he said that freezing and thawing of normal concrete showed a wide range of resistance to the tests, whereas air-entrained concrete showed uniformly excellent results for all the cements used.

The speaker also pointed out, that as a result of the tests, it was proved that the air-entrained improves the resistance to freezing and thawing, and not any chemical or physical characteristics of the admixtures used.

In reply to a question from the floor, Mr. Bartel said he had no data on the resistance of air-entrained concretes to chlorinated waters, but he said that hard waters had no unusually bad effects.

Employer-Employee Relations

An open forum on employer-employee relations was held the evening preceding the start of the general sessions for the National Sand and Gravel Association and the National Ready Mixed Concrete Association. Executive secretary V. P. Ahearn, his assistant Kenneth E. Tobin, Jr., and Charles A. Horsky, counsel for the associations, were the discussion leaders for a well-attended informal session that drew many questions from the floor. Principal topics considered were Wage and Hour Law problems

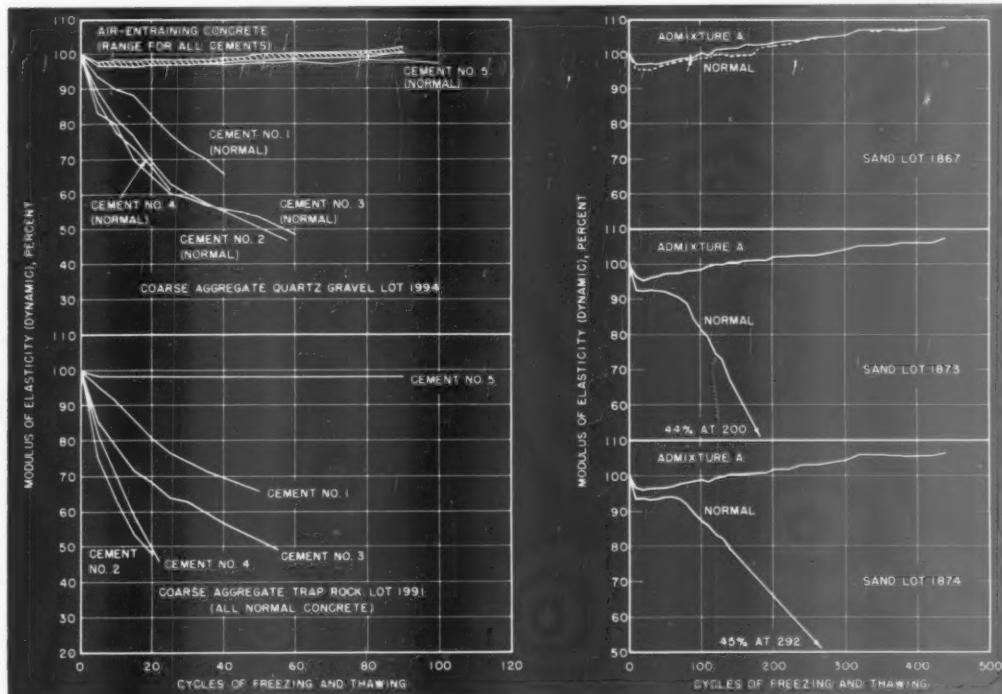


Mrs. C. "Dolly" Gray, Indianapolis, Ind., left, chairman, ladies' entertainment committee, with Mrs. J. Murray Gallagher, New York City, a committee member

as presented by the Bay Ridge decision and the prospects with respect to amendments to the Taft-Hartley Act.

In opening the discussion of the Wage and Hour Law, Mr. Ahearn said that amendments likely will broaden coverage to extend to activi-

ties affecting commerce, and not be restricted to commodities that move across state lines, which would mean that all individual companies no doubt would come under its provisions. Production for an instrumentality of commerce would be the governing fac-



Additional charts of freezing and thawing cycles plotted against modulus of elasticity changes

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tor. Attempts to raise the minimum wage to 75c per hour, which could then easily be raised to \$1, likely will prevail in Mr. Ahearn's opinion. It is also likely that the statute of limitations will be increased from two to four years.

Mr. Tobin had prepared an extremely informative series of slides which he showed, detailing exactly how calculations are made of total weekly earnings under the Wage and Hour Law, for work in excess of 40 hr. in a work week and where holidays are involved. The series of slides covered practically all the conditions that would be encountered which

might not be clear, and Mr. Tobin ran through all the calculations to show the possible savings and penalties which depend upon how the payroll week is begun. The important thing is the method of computation, not the day of pay, and the safest course is to begin the payroll week on Monday morning.

Mr. Horsky discussed the Taft-Hartley Act, its present provisions, and amendments to the Act which have been proposed and which, if adopted, will be very partial to unions and their activities. Politics and not logic will have a bearing in changes to the law, he said.

Analyzing Crusher Performance

ONE OF THE most interesting discussions in one of the N.S.G.A. sessions was devoted to "Specification Requirements for Aggregates Presenting Difficult Plant Operating Problems" and the discussion was planned under four main heads, (a) grading specifications, with particular reference to fine aggregate, (b) soft particle limitations by abrasion and abrasion and soundness tests, (c) crushed particle requirements and (d) limitations on various impurities.

Stanton Walker, in introducing the subject, briefly discussed the new specifications for sand gradation as proposed (and used at some jobs) by the United States Corps of Engineers and compared these specifications with the ones that had, after years of effort, been adopted by the industry and by users of aggregates in general. (For a detailed discussion of this same subject, see the December, 1948, issue of *ROCK PRODUCTS*). These new specifications present plant problems that as a rule mean blending of different sizes of sand, or preparation of a manufactured sand to blend with the natural product so as to keep within

the size specifications, and within the fineness modulus ranges which, in the newer specifications, play a larger part and have narrow limitations.

It was asked what price the producer was going to receive for such sands as proposed by the Corps of Engineers specifications. Mr. Walker said that he knew of one job where the price was as high as \$6.25 per ton. Ray V. Warren asked if the new specifications were being used on any specific jobs and the reply was in the affirmative. To point out what could be done in the east toward meeting rigid requirements, Elliott Harris of the Metropolitan Sand and Gravel Corp., Port Washington, N. Y. said they were blending three sizes of sand and that the fineness modulus was being held within .05 limits.

A highlight of this session was the paper delivered by E. K. Davison, Pittsburgh, Penn., on "Suggested Method of Analyzing Crusher Performance in the Elimination of Soft Particles." He said we must admit that higher losses in the Los Angeles rattle and sulphate tests are indicative of the presence of a substantial

number of soft particles, and he predicted this by assuming one was dealing with a heterogeneous aggregate. If the coarse aggregate has a fairly uniform specific gravity, and the soft particles are scattered uniformly through all sizes of the coarse material, he said the practice was to crush the material with the hope there would be a selectivity, and that the soft stone would be crushed more than the harder and be reduced to a size not used in the finished product. He maintained there were complications in this practice; first, soft particles sub-divided by a crusher are still soft particles and secondly, hard particles are sub-divided, though not so fine as the soft particles. In order to keep the finished product from becoming too fine, it is necessary, generally, to use a crusher feed which grades coarser than the desired finished product. Mr. Davison brought out that in many gravels the relative proportions of soft and hard particles are different in the coarser sizes, and that the task of elimination may become easier or more difficult, depending on the size distribution of the soft and hard particles. As this is a difficult operating problem, Mr. Davison felt that if the producers understood a few of the fundamental laws and ratios, which have been evolved to account for the work of crushers, such understanding might save aimless experimentation.

By means of slides (Fig. 1), the speaker gave a most useful method of presenting data on crusher performance which is by using a modification of the familiar grading analysis graph. The ordinate of this graph showed the cumulative percentages of weight passing the sieves; however, instead of plotting sieve opening direct on the horizontal axis, the speaker used percentage of maximum sieve opening of the crusher feed. In other words, if 100 percent of the crusher feed passes the 4-in. sieve, he plotted the amount passing the 2-in. sieve on the 50 percent line and the 1-in. sieve would be 25 percent of the maximum size. If 2 in. is the maximum size of the crusher feed, then the 1-in. sieve would be plotted on the 50 percent line, and so on. He pointed out that by using a graph, crushers using feeds of different maximum sizes can be easily compared on the same chart. As his paper contained so much of interest on this subject we quote Mr. Davison direct at some length:

"Let us assume, then, that we have a homogeneous crusher feed for which the grading would plot as shown and the crusher product can be plotted as shown. We can express a reduction ratio for any given 'percent passing' by dividing the feed size on that line by the product size on that line. Thus the reduction ratio at 80 percent passing would be 65/33 and at 50 percent passing would be 41/22 (see Fig. 1).



Bob Porter, left, and Norman Fredericks, right, president and secretary-treasurer, respectively, of N.R.M.C.A.; and T. E. Popplewell, president, N.S.G.A.

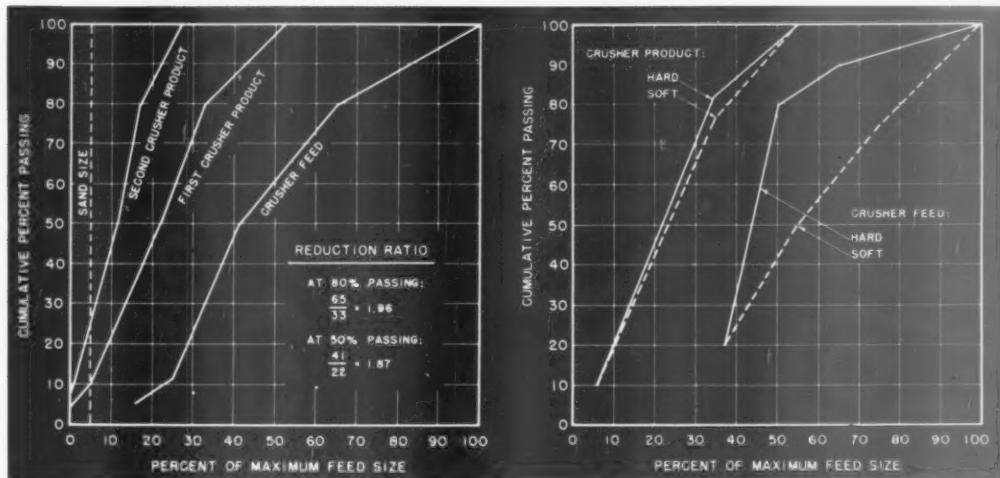


Fig. 1 (left): Data on crusher performance according to grading analyses. Fig. 2 (right): Data showing relative reduction of hard and soft particles through crushing

Rittinger's law of crushing states that the work done in crushing is proportional to the reduction in particle diameter. While it is probably not strictly accurate, we may assume for our present purposes that, if we run this crusher product through the same crusher, our second crusher product will, when plotted, have the same reduction ratios with relation to the first crusher product as that product had to the original feed.

"Now let us consider a heterogeneous gravel sample in which we have both hard and soft particles. Usually there are various degrees of hardness and softness, but we will assume that in this sample we can fairly accurately separate hard from soft and then run a separate grading analysis on each type. Assume that when plotted, the grading curves of these two types are as shown in Fig. 2. It will be seen that the soft particles tend to be of coarser gradation than the hard particles. Suppose that when we crush these samples we find the product curves for each type practically coinciding. This means, for one thing, that the reduction ratios for the soft particles is greater than those for hard particles. For example, along the horizontal line representing 80 percent passing, the distance between the soft feed and product lines is greater than the distance between the hard feed and product lines which indicates greater reduction in size. To express it another way, the 80 percent passing reduction ratio equals 80 percent of maximum feed size, which is the intersection of the soft feed grading curve with the 80 percent passing line, divided by 38 percent of the maximum feed size, which is the intersection of the soft product curve with the 80 percent passing line.

"Now if we find that this crushed product has so many soft particles that the Los Angeles Rattler loss is over the limit there are several corrective steps which are suggested by study of the graph. For one thing, it would seem logical, with the feed pattern shown here, in which the soft particles lie on the coarse side of

the chart, that a finer feed would increase the proportion of hard particles in the feed and consequently in the product. This might be done by using a smaller bottom size for the feed than we have shown, or by reducing the top size of the feed. The graph shows that we definitely cannot raise the bottom of the feed, for it is obvious that we would thereby increase the proportion of soft particles. If we have sufficient additional information on the relative proportions of soft and hard particles in each of the sizes which we graded, we can make a reasonable prediction of the soft particle content of our anticipated product.

"Another remedy for which we can reasonably predict the result is to recrush the product in the same crusher, or in another crusher with equal force. It has been noted that the reduction ratios for soft particles are greater than those for hard particles. For example, along the horizontal line representing 80 percent passing, the distance between the soft feed and product lines is greater than the distance between the hard feed and product lines which indicates greater reduction in size. To express it another way, the 80 percent passing reduction ratio equals 80 percent of maximum feed size, which is the intersection of the soft feed grading curve with the 80 percent passing line, divided by 38 percent of the maximum feed size, which is the intersection of the soft product curve with the 80 percent passing line.

In this case the 80 percent passing reduction ratio for soft particles is 2:1, while the corresponding ratio for the hard particle is 50 to 33 or 1.5:1. If we recrush this product with the same force as the original

crushing, we can expect about the same ratios to apply and it is apparent that the curve for the soft product on this second crushing will be pushed farther towards the fine side of the graph than the hard product will be. It then becomes possible to separate many of the soft particles from the finished product by sizing. While taking these soft particles out as tailings is common experience, the use of an analysis such as described may point to some size in the coarse aggregate where effective soft particle elimination can be made.

"Another method of pushing the soft product curve to the fine side of the grading graph would be to exert more crusher force by higher speeds, closer settings, etc. In this case analysis by means of this chart is a very useful way of comparing performances of competing crushers.

"It can be readily seen that if the grading curves of the soft and hard crusher feeds nearly coincide, or if the soft particle feed curve lies to the fine side of the graph, the separation of the product curves can become very pronounced, with the soft particles always finer, and separation of soft from hard particles by screening is easy. This might suggest the use of less powerful crushing where coarser product grading is desired and, with sufficient information, a reasonable prediction of expected results can be made . . .

"... I have offered nothing original towards the solution of the problem but I do believe that a thorough study of the size distribution of the various types of particles occurring in your deposit and the presentation of these data by means of the grading curves which have been described offer a more rational and less costly analysis of

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Two Californians stopped for a picture—Harry E. Bender, Azusa, left, and M. G. Farand, Los Angeles

the problem than random experimenting with a number of different crushers and eliminators."

Owing to lack of time, the other subjects on the agenda for discussion were not taken up as such nor was there any floor discussion of the highly informative paper of Mr. Davison.

Joint Luncheon

Robert Mitchell was presiding officer for the joint luncheon of the National Sand and Gravel Association and the National Ready Mixed Concrete Association on February 17. Mr. Mitchell introduced a distinguished visitor from England, Col. H. E.

Peirce, president, Hall & Co., Ltd., London, and chairman, Ballast, Sand and Allied Trades Association of England. In his introduction Mr. Mitchell said that Col. Peirce's company had quarries and pits, one lime operation, 60 supply depots, 800 trucks, about 2000 employees and that the company served an area of about 250,000 sq. mi. Col. Peirce then gave a brief talk, telling part of the history of his company which dates back 100 years or more.

The principal address at the luncheon was given by M. W. Clement, president, Pennsylvania Railroad Co. Mr. Clement paid tribute to the sand and gravel producers for their contribution to progress and the economy of the United States. He said that the railroads and the sand and gravel industry have many problems in common, as they both dealt in low-cost commodities. He pointed out that the sand and gravel operators moved in a free sector of the national economy, and could cope quickly with changes in their cost structure, but the railroads moved in a regulated sector and when they seek price adjustments to cover higher transportation costs, they are invariably faced by segments of the sand and gravel industry who oppose their requests for increased revenues.



Daniel J. Miller, Portland, Penn.

shapes and sand sizes. The trouble, in natural sand, is one of uniformity.

In answer to another question, Mr. Gilbert said that it is possible that no minus 100-mesh particles may be specified for certain projects, depending upon degradation in the concrete mixers. In natural sands, he said there will likely always be a requirement for those fines because it has been found that degradation in the mixers occurs chiefly with manufactured sands.

U. S. Army Construction Program

Scope of the construction program of the Corps of Engineers was outlined before a joint session of the N.S.G.A. and N.R.M.C.A., by Brig. Gen. G. J. Noll, who substituted for Lt. Gen. Raymond A. Wheeler.

Gen. Noll discussed policies and responsibilities of the Corps of Engineers and pointed to the importance of the projects being built under its jurisdiction. As an example of the large quantities of materials involved, he gave some figures for the Bull Shoals project on the White river in Arkansas. The dam will be a massive concrete gravity structure, 2349 ft. in length and have a 278-ft. maximum height. Estimated federal cost is \$76 million. The project will require 2,100,000 cu. yd. of concrete, involving the use of 1,800,000 bbl. of cement and 6,300,000 lb. of reinforcing steel. The end sought in requiring the best available materials, he said, was that the American people shall receive the best projects for their money.

He told of the laboratory facilities being provided for tests in order to secure good concrete (See the paper by J. R. Gilbert, National Crushed Stone Association convention report, March, 1949, issue, *ROCK PRODUCTS*.)

If President Truman's requested \$734 million for river and harbor

Civil Works Aggregate Requirements

SPEAKING BEFORE a session of the National Sand and Gravel Association devoted to aggregates requirements for structures, J. R. Gilbert, chief, Concrete Branch, Corps of Engineers, in a paper "Requirements for Aggregates for Civil Works," outlined the policies of the Corps with respect to aggregate selection. Recent procedures are new to the industry and a source of considerable difficulty, so Mr. Gilbert's paper was one of extreme interest.

The speaker covered the same subject before the convention of the National Crushed Stone Association the week previous, and his paper and remarks at that meeting were published practically in full in the March, 1949, issue of *ROCK PRODUCTS*. Herein, we merely comment on his remarks specifically to the sand and gravel industry and in reply to questions raised from the floor. We urge that readers refer to Mr. Gilbert's paper, as published in the March issue, for many of the details. Briefly, he emphasized that it was not the policy of the Corps to use vastly superior aggregates but, instead, to use the best quality aggregates locally and economically available to a given project. Any projects built today, he said, will have accompanying records for future examination in evaluating performance of concrete.

Mechanical gradation, uniformity and air-entrainment are the only physical limits now required, he said, in mentioning that all other factors have been deleted from specifications. As far as tests are concerned, the emphasis today is on ascertaining what may be expected in terms of service of the concrete. Low water-cement ratio and lean mixes are the mandatory requirements for durability and strength.

It has been found that a great deal of minus 100-mesh fines in sand inhibits air-entrainment and requires the use of more water than is desired. It is now considered to hold the No. 4- to No. 16-mesh fraction low to minimize extra water requirements to offset harshness. Air-entrainment is considered a desirable feature for mass concrete. Requirements for the large concrete projects are stiffer because it is intended that dams have a life of 100 years or more.

In reply to a question as to the effect of flat and elongated particles in sand, Mr. Gilbert said that particle shape is unimportant in manufactured sand. The trend is coming to requiring as little as 0.3 percent minus 100-mesh particles because it has been found that the mixers manufacture fines that require the addition of more water. Gradation, he said, is the answer to harshness due to particle

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improvements and flood control works for the fiscal year 1950 is appropriated by Congress, a new all-time high in such appropriations will be reached. Of that total, \$620 million would go for new construction. There are 61 river and harbor construction projects and 157 flood control construction projects in the 1950 budget. Gen. Noll itemized the figures for various dams. It is expected that about \$350 million will be appropriated for Army and Air Force construction in the next fiscal year. There are 51 hospitals in the Veterans hospital construction program.

By the end of the 1948 fiscal year, the Corps of Engineers had completed 172 local flood control protection projects and 56 flood control reservoirs. According to the General, the cost of these projects to June, 1948, was \$483 million but the estimated value of damages prevented exceeded \$500 million.

Highway Engineering Studies

G. Donald Kennedy, vice-president, Automotive Safety Foundation, discussed modern concepts for planning highway building and maintenance programs in a paper, "Orderly Highway Programs on Engineering Study."

Mr. Kennedy, in commenting on the value of highways and the planning that went into them, cited how highway building was the means of making use of motor vehicles to an extent that it was possible to develop in this country the world's highest standard of living. This could not have been accomplished, he said, without sound planning. The nation's highways have paid tremendous dividends far beyond their cost, he said, but to preserve the highway systems will require expenditures of large sums to combat obsolescence, deterioration, congestion and high traffic accident tolls. He pointed to the upward swing in the pressure of traffic, mentioning that in 1948 some 41,000,000 vehicles traveled 400 billion vehicle miles over 3,300,000 miles of roads and streets. Highway usage, he said, has grown so vast and complex and so important to the na-

tion's economy that year-to-year planning and programming cannot satisfactorily meet the responsibilities. In this regard, he mentioned the initial step taken by the U. S. Public Roads Administration in the 1930's in cooperation with the states in state-wide highway planning studies. He summarized the factors that need consideration in well-planned, long-range studies, including future costs. Mr. Kennedy said that the construction

price index will continue throughout 1949 and will thereafter recede until about 1953, then to stabilize at about 150 percent of the pre-war base.

The summary of annual requirements; for all roads and streets and including construction, maintenance and administrative requirements, is usually presented for periods of 10, 15 and 20 years in order that a state legislature has the facts for a choice of program geared to financing ability.

Concrete Aggregates for Highways

F. H. JACKSON, Principal Engineer of Tests, Public Roads Administration, in his paper, "Requirements for Concrete Aggregates for Highway Construction," generalized on some ideas that may help improve our highway construction, referring particularly to grading of aggregates as it bears on concrete. Much of his paper was based on his survey of highway construction practices in Germany and England which were illustrated by slides.

The prevailing practice in this country of emphasizing workability and ease of placement rather than strength and density of concrete, resulting in the use of plastic, over-sanded mixtures, was pointed to as one difference in comparing our practices with those in Germany where concrete pavements are standing up much better. The heavy layer of weak mortar on the surface of a pavement which results is easy prey to frost action and scaling. As a result of inspection of pavements in Europe, Mr. Jackson is convinced that improved durability can result from the use of drier mixes designed for placement by vibration or tamping, or a combination thereof. In building the German Autobahnen, heavy mechanical equipment, including mixers, spreaders, vibrators and finishers, was built to handle zero slump concrete mechanically. The Germans constructed 2500 miles of 4-lane pavement in six years.

The quality of the roads is excellent. The slight excess of mortar over the

minimum to fill the voids wore or scaled off quickly, leaving the coarse aggregate exposed over the surface of the pavement. The resulting surface had a terrazzo-like texture and good rideability.

For uniformity, German practice was to specify that the aggregates be separated and batched in several separated sizes. Maximum size of aggregate was limited to 1 in., although larger size was permitted in the lower course typical two-coarse construction. Only the hardest and toughest varieties of aggregates were permissible in the top coarse and frequently aggregates were imported from great distances.

In England, a top size of 1½-in. aggregate is permissible in heavy airport runway slabs, where it has been proved possible to compact 12-in. slabs in one course using surface vibrators. No heavy mortar top surfaces, which scale easily, were seen. Much attention is paid to subgrade construction particularly in Germany.

Slides showing actual construction were interesting. Sun shades protected the actual process of pouring and heavy screed tampers and vibrators were employed. Mr. Jackson concluded with the following summary:

(1) He feels that our present methods of building concrete roads are wrong. The trend has been too much in the direction of speed and expediency.

(2) He is not convinced that air-entrainment is the final answer to



Ladies at the get-together tea pose for a group picture



At Manufacturers' Division breakfast meeting are, left to right, seated, Morgan R. Butler, E. J. Goes, Chairman W. W. King and Past-chairman A. E. Conover. Standing, from the left, are L. C. Mosley, E. M. Houston, R. C. Johnson, C. B. Laird, R. McLean, J. C. McLanahan and R. P. McKendrick

the problem of ice control.

(3) He believes that, by making adjustments in materials, equipment and procedures we can definitely improve durability and strength of concrete. These adjustments would include:

(a) The substitution of effective vibratory methods for consolidating the concrete for the present method of surface screeding which provides no compaction.

(b) The use of $1\frac{1}{2}$ -in. slump concrete to be placed by vibration, replacing the 2-3-in. or higher slump concrete in use.

(c) Reduction of maximum size of coarse aggregate to 1-in. with the followed probable size separation.

1 in.—	$\frac{1}{2}$ in.
$\frac{1}{2}$ in.—	No. 4
No. 4—	No. 16
No. 16—	No. 50
Under	No. 50

These separations would ignore the distinction between fine and coarse aggregate. These separated sizes would be carefully blended.

(d) The redesign of construction equipment to properly handle the drier mixes.

Fundamentals of Concrete Design

An open forum on the design of concrete mixtures was held on the evening of the first day with Stanton Walker serving as chairman. He was assisted by Fred F. Bartel and Delmar L. Bloem, both of the technical staffs of N.S.G.A. and N.R.M.C.A. As Mr. Walker said at the outset, this was essentially a "pick and shovel" school, or class room for those desir-

ing to have problems in concrete design worked out by the joint efforts of the technical staff.

At the outset of the session, all present were given a 4-page pamphlet in which proposed problems were outlined, along with basic data for their solution. The problems were worked out on the blackboard by Mr. Bartel and Mr. Bloem. The meeting was well attended and there obviously was a considerable interest in acquiring a working knowledge of how to work out problems in concrete design, both for normal concrete, and for air-entrained concrete.

Highway Demands

B. D. Tallamy, Superintendent of Public Roads, Department of Public Works, State of New York, in a paper "Meeting the Highway Challenge," gave an outline of the New York program and discussed problems common to all states in developing adequate highway building programs.

Mr. Tallamy stressed that there is need for more public information to be put across to the people of the nation, to impress upon them the absolute necessity for adequate highways in order to keep pace with all the demands of our civilization. The public, he said, must be made to understand that its very existence depends upon highways and streets, and to realize that the roads and highways cost money for their building and maintenance.

He pointed out that thousands of miles of highways were already old when the U. S. entered the war. In New York State, he said, 5100 miles of its 14,000 mile system are over 20

years of age which is the equivalent of 75 years in the life of a person. An additional 5800 miles are 10 to 20 years old, and 1400 miles have never been improved.

In discussing increasing requirements and changes needed to accommodate new and greater demands, he mentioned the necessity for reducing



F. H. Jackson, Public Roads Administration, one of the principal speakers at the sand and gravel meet

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grades, increasing many roads from two to four lanes, and actual needs for new replacement highways in certain places. These requirements exist in all states. The secondary roads, he said, are now becoming traffic-saturated and we must do what is necessary to keep urban areas vitalized. The problem cannot be solved, he said, without recognition of the needs.

New York State has a long-range program but, he emphasized, the need is for long-range financing in order to plan correctly as contrasted to expediency. New York State requires that \$143 million be spent each of the next 14 years, or \$2 billion, for a restoration job. Then, the cost will drop to a requirement of \$80 million annually.

Construction in a Free Society

One of the most inspiring papers presented before the N.S.G.A. and N.R.M.C.A. conventions was one entitled "Construction in a Free Society" by Thomas S. Holden, president, F. W. Dodge Corp. Mr. Holden covered construction prospects for 1949 and gave emphasis to the role of a free society in building up the country. He believes that 1949 is a critical year for the American economy now that the inflationary boom is ending and we have a return to a buyer's market.

Mr. Holden believes that stabilization of business could be easily effected if federal expenditures were reduced and federal taxes held at present rates or moderately reduced. However, he believes that that ideal is unlikely.

The acute phase of the housing shortage is over, he said, and actual needs have all along been exaggerated by propagandists who favor extensive government housing programs. Non-farm housing has increased by 22 percent since 1940, he said, whereas non-

farm population has increased 18 percent. Home builders are now aiming at cost and price reduction in order to broaden an otherwise narrowing market.

F. W. Dodge Corp. 1940 estimates for construction, as published in November, 1948, had indicated a decline of 7 percent in physical volume of building as compared with 1948, and anticipated that increases in building of schools and hospitals and in heavy engineering construction would offset declines in other categories. The contract trend in recent months, he said, has partly confirmed the predictions.

New housing accommodations built since V-J day have been more than double the aggregate number in 16 western European countries despite the fact that home builders had to battle government controls, material shortages and other abnormal conditions, including inflationary costs. Yet, he said, construction costs did not increase at a disproportionate rate. Mr. Holden was outspoken in his praise of progressiveness of the construction industry.

Much of his paper dealt with trends in government that threaten the industry and the nation itself, referring to threats to the American free enterprise system. Specifically, he referred to centralization of political power, peacetime conscription, heavy government spending, government interference with the private economy and the possibility of early return to deficits as having serious implications. Total tax collections of federal, state and local governments in 1948 amounted to \$50 billion, or 26 percent of all income earned in the nation. Then, he mentioned President Truman's proposals which would heap more load on the economy. He believes that federal tax rates may result in decreased revenues and that there is such a thing as government pricing



Howard W. Jordan, Metropolitan Sand and Gravel Corp., Port Washington, New York, a newcomer to the conventions

itself out of the market. New deficit spending, he warned, will mean new inflation and renewed clamor for all kinds of government regulation.

Aggregates for Bituminous Roads

E. F. Kelly, chief, Division of Physical Research, Public Roads Administration, presented a paper on "Some Problems of Bituminous Road Construction Relating to Aggregates." His paper dealt with the subject in a rather broad manner. At the outset, he described the different kinds of bituminous materials (tars and asphalts) and spoke briefly of their source, and of their physical characteristics. He said the asphaltic materials most commonly used were classed as semi-solids or liquids and that the former were called asphalt cements. They are also called penetration-grade asphalts. Standard specifications for such materials range from a low of 40 to a high of 300. He said those rated at less than 60 were seldom used and that asphaltic cements had to be heated to a relatively high temperature to render them fluid.

Among the liquid asphalts, he included rapid-curing and medium-curing cutback asphalts, slow-curing asphalts, and asphaltic emulsions. Omitting the emulsions, he said the other liquid products are classed as rapid-curing, medium-curing, and slow-curing and that each class is produced in 6 grades ranging from low viscosity to those of a higher viscosity. The latter have to be heated.

He described the rapid-curing cutbacks (RC) as being a blend of asphaltic cements (85 to 100 pene-



President T. E. Popplewell of N.S.G.A. with retiring president C. "Dolly" Gray of N.R.M.C.A.

(Continued on page 154)

Agstone

CONSERVATION In The National Interest

Relation of soil liming to farm income; physical and chemical specifications; state by state requirements for agstone summarized in response to a request by the editors

HOW MANY eggs did you eat in 1948? The average American consumed 388. That was 90 more than he consumed in the prewar years, 1935-39. Not only did he eat more eggs, but he also ate more of other foods: 12 percent more.

But why should a dealer in agricultural limestone or phosphate be concerned with the number of eggs or the amount of food eaten by anyone? He's in the limestone or phosphate business, not the poultry business.

The answer to that is really quite obvious. The ultimate market for agricultural limestone, and phosphate, and potash, and boron, and all the other minerals used in the production of crops, is in the grocery stores and meat markets of this country. How much food is consumed determines how much food needs to be produced. The need for production, market demand and price, determines to a large extent the outlet for rock products used in food production. The same is true of the non-food commodities produced on our farms.

Per Capita Food Consumption

That is why it is significant that the per capita consumption of food in the United States for 1948 was 12 percent more than the average for 1935-39. It is significant to the rock products trade because these products helped to make the increase possible. At the same time, of course, increased food consumption helped the market for rock products.

Not only did the average American eat 12 percent more food last year than he did in the prewar years, but there were more of these "average Americans." From 1940 to the end of 1948 the population of the United States increased from 132 million to 148 million. That is an average of 2 million a year.

At that rate, how long will it be until there are 170 or 200 million

*Administrator of the Production and Marketing Administration and President, Commodity Credit Corp., U. S. Department of Agriculture.

By RALPH S. TRIGG*

people to feed in this country. How long can the 1948 per capita consumption of 388 eggs, 146 pounds of meat, and 180 quarts of milk be maintained with population increasing at the rate of 2 million a year? Can our farm plant support such consumption?

Some rather gloomy pictures of this situation have been presented in recent months. The ghost of T. R. Malthus has been coming back. Seeing the tremendous increase in population on the one hand, and the destruction of our soil resources on the other, number of leading scientists have called attention to the "inevitable conclusion" that when there are more people than the land will support, famine, disease, poverty, and misery are the result.

We may be nearer to tipping that balance than some of us think, but there is real hope in the production of a crop such as the farmers of the United States harvested in 1948. Even more significant than the total production was the per acre yield of crops—51 percent more than the 1935-32 average.

Yes, our frontiers are under our feet—our land frontiers, at least. And this 51 percent increase in production over that of the twenties indicates that we are making progress in conquering these new frontiers. We are making our land produce more, 51 percent more.

But can we keep it up? Can we boost that production to 52, 55 or 60 percent more, if we need it?

What are the possibilities? Can the dealers, distributors, and producers of agricultural rock products help? Here are a few significant facts which may indicate what can be done:

Crop production figures show that the yields—the per-acre yields—of six important crops—cotton, corn, hay, wheat, and oats—showed no major increase during the 70 years before 1937. But since 1937 production of all these crops has increased greatly.

Certainly, this increased per-acre yield cannot be credited to any one factor. Many factors contributed, including favorable weather. But it is significant that during the 10 years, 1937-46, farmers in this country applied three times as much liming materials as the total applied to farms in this country up to that time. By 1947 the use of fertilizers had increased 380 percent over the amount used in the pre-depression years 1925-29—from less than 4 million tons to over 15 million tons.

Also, I think it is significant that this increase in production and this increase in the use of agricultural limestone and fertilizers has come since Congress set up the Soil Conservation Service and the Agricultural Conservation Program.

The Agricultural Conservation Program, with its elected farmer-commitees in every agricultural county and community in the country, has been a potent force in getting better conservation and farming methods adopted in a short time on a wide front.

The A.C.P. seeks to overcome erosion, depletion, and deterioration of the soil and inefficient use of water in the growing of crops by actual installation of conservation measures to safeguard soil and water resources. It provides assistance to farmers in carrying out approved practices on their farms. The assistance is a direct and practical means of making research and educational work effective. It gets action that is necessary to meet conservation problems.

Conservation Practices

Assistance under the program recognizes the obligation of the whole people to share the responsibility as well as the benefits of assuring the continued productivity of the country's farmland.

Assistance is provided in two forms—cash payments made after completion of approved practices needed in meeting conservation problems of the farm, and materials or services for

AGSTONE

carrying out scientifically approved conservation practices. Materials may be limestone, fertilizers, or seed. Services may consist of earth moving, terrace construction, or similar work. The amount of assistance varies with the practice. The farmer contributes 35 to 50 percent of the "out-of-pocket" cost, and in addition he provides such items as transportation to the farm, application of the materials, the seeding of conserving crops, or the necessary hand work incidental to earth-moving practices. The program also acts as an incentive for farmers to carry out soil-building and conservation work in addition to those practices for which assistance is provided.

This improved farming, encouraged under A.C.P., has made a substantial contribution to the increase in per-acre yields of major crops. But, more than that, it is building reserves in the soil for future production.

Right now, when the bins and cribs are filling up in the "ever-normal granary," it is as much a part of conservation to use the land to produce what is needed, and avoid wasting soil resources on unneeded commodities, as it is to prevent the waste of soil fertility through erosion and depletion.

Some of the practices carried out by cooperating farmers under the A.C.P. program during the 12 years 1936-47 and used to meet conservation problems over wide areas, are shown here:

1. Practices to maintain and strengthen soil fertility and thus prevent erosion and depletion: 186 million tons of agricultural limestone applied on 105 million acres; 16 million tons of phosphate applied on 123 million acres; 198 million acres devoted to green manure and cover crops; 37 million acres of pasture and range reseeded; 710,000 pasture and range stock-water developments — ponds, springs, and wells.

2. Erosion-control practices on land too depleted or too steep to be safely farmed without structural practices: 742,000 miles of terraces constructed on 14 million acres; 111 million acres of crops cultivated on the contour; 7½ billion square feet of sod waterways built.

3. Drainage and irrigation practices: 317 million cubic yards of earth moved in draining about 9 million acres; 55,000 miles of tile drainage installed, on approximately 1 million acres; 3 million acres leveled for efficient irrigation; 60 million cubic yards of earth moved in reorganizing farm irrigation systems.

4. Forestry practices: 622,000 acres of trees planted; 480 acres of woodland improved.

Nearly half of the farmers in this country participated in the 1948 Agricultural Conservation Program. And these participating farmers operated about two-thirds of the cropland in

the United States. Certainly they produced substantially more than that proportion of the nation's food and fiber.

Preliminary reports for 1948 indicate that cooperating farmers particularly stressed the construction of terraces, contour planting of tilled crops, strip-cropping, the construction of dams for livestock water, more efficient use of water in irrigated areas, tree planting, seeding of pasture, the planting of green-manure and cover crops, and the use of superphosphate and liming materials to stimulate growth of crops to protect and improve the soil.

The following are some of the accomplishments under the 1948 program: nearly 64,000 miles of terraces constructed on 1½ million acres of land; more than 6 million acres protected from wind and water erosion by stripcropping; nearly 40,000 dams constructed to check damage to grass and land which might be caused by concentration of livestock at limited waterholes; more than 67,000 acres of trees planted; more than 3 million acres of pasture seeded; more than 13 million acres devoted to green-manure and cover crops; 16½ million acres treated with superphosphate to stimulate the growth of conserving crops; and nearly 11 million acres improved with agricultural limestone.

Case Histories

These figures take on added meaning and interest when applied to specific cases. For instance, take the case of George Simpson, the Connecticut farmer who won the New England "Green Pastures" contest in 1948.

Mr. Simpson has been cooperating in the Agricultural Conservation Program since 1939. Under the 1947 program he obtained assistance through the A.C.P. for 9 tons of superphosphate, 2 tons of potash, 2 tons of

4-24-8 mixed fertilizer, 3 tons of 8-16-16 fertilizer, and 15 tons of lime.

The same year he protected 12 acres of his land with a winter cover crop and improved 3 acres of pasture with assistance provided under the A.C.P.

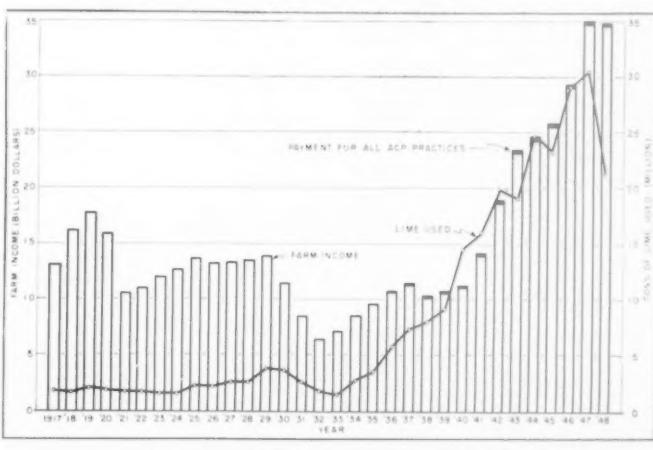
His gently rolling farm on North Farms Road, Wallingford, Connecticut, was singled out for the top place in the Green Pastures Contest last year. This 100-acre farm—76 acres improved—provides feed and pasture for some 34 head of milk cows and 16 head of young stock. His pasture season in 1948 was from April 23 to early November.

His Dairy Herd Improvement Association records showed 8,055 pounds of milk testing 4.77 percent butterfat and 385 pounds of fat per cow for 1947. May, 1948, records showed 820 pounds of milk June, 1948, record, 880 pounds of milk per cow from 33 cows.

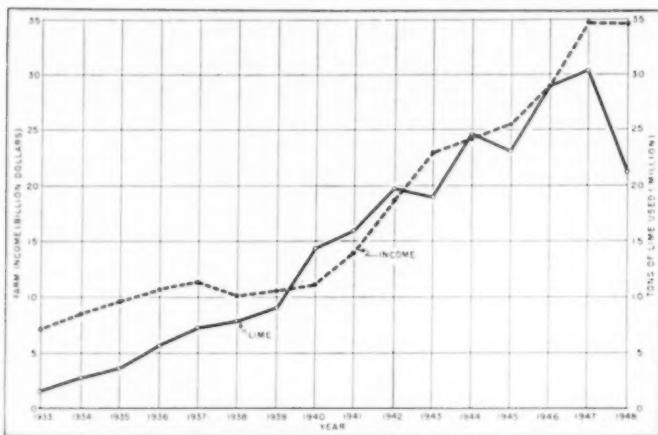
In 1938, Fred Collins of Glade Valley, North Carolina, took over his father's farm. There had been no lime or phosphate used on the farm, and the pastures were not producing anything except wild grasses and dewberry briars. The hay being produced was of low quality. Now the whole farm has been limed and phosphated, most of the pastures reseeded, and all the permanent meadows reseeded to tame grasses and alfalfa. At the time Mr. Collins took the farm, 71 acres of pasture were carrying only 18 head of cattle. In 1946, 81 acres of pasture carried 36 head, and the cattle were much better fed. This improvement was made by the use of liming materials, phosphate, manure and reseeding. In the past 6 years Mr. Collins has used 313 tons of agricultural limestone and 25 tons of superphosphate.

From Kansas comes this interesting story:

Leroy Froebe, of Labette county,



AGSTONE



Farm income and liming materials used: 1933—1948

operates a farm owned by Bruch Young, of Hutchinson. The farm is located two miles east of Mound Valley. In connection with the Agricultural Conservation Program and its provision to assist farmers in obtaining agstone on a share-the-cost basis, Mr. Froebe and Mr. Young have a long term lease with a provision whereby Mr. Young pays part of the cost, Mr. Froebe a part, and the assistance provided under A.C.P. a part. It is a three-way plan of cooperation. Under this agreement, Mr. Froebe has applied 247 tons of lime.

In the spring of 1947 he seeded 36 acres of sweet clover on land that was limed in 1946 at the rate of 3 tons per acre. The clover was seeded with oats as a nurse crop, and 115 pounds of superphosphate were applied per acre of clover and oats. The oats averaged 60 bushels per acre, and Mr. Froebe reports that there is now a good stand of sweet clover which has furnished some pasture for 28 head of cattle and 70 head of hogs. The sweet clover was used as pasture before being plowed under for green manure.

After Prentis Monk, a farmer of Magnolia, Arkansas, used phosphate and agricultural limestone on a part of his pasture, the carrying capacity

increased to 1½ to 2 acres per animal compared with 4 to 5 acres before.

Then there's Tom Briscoe of Tipton, Missouri, who has been cooperating in the Agricultural Conservation Program since it started. He has served as a county committeeman-elected by the farmers of his community and county—and as a member of his State Committee.

Mr. Briscoe says that the conservation practices carried out on his farm have doubled his crop yields and materially reduced soil erosion. He estimates that A.C.P. payments have taken care of part of the cost of carrying out about half the conservation work done on his farm, but these payments also have made it possible to speed up greatly his entire conservation program.

Mr. Briscoe uses liming material and phosphate, grows all his crops on the contour, and has improved his farm with terraces, grassed waterways, and concrete structures to prevent erosion.

These are but a few of the thousands and thousands of instances that add up to conservation's part in the 35 to 40 percent increase in total farm production, the 51 percent boost in yields which helped make possible a 12 percent increase in per capita con-

sumption for a population that has increased 16 million in the past 8 years.

Every person in the country depends on the soil for a living. Conservation of that soil is a national responsibility. Through the Agricultural Conservation Program, the people of the country cooperate with our farmers in carrying out conservation practices which are necessary for the protection and well-being of all the people.

Conservation Costs

Divided among all the people the funds appropriated for the 1948 A.C.P. would amount to about \$1.00 per person. To that dollar the farmer added his dollar and his work. In addition, encouraged by this assistance and made aware of the benefits from conservation, he carried out additional practices. As a result, the total conservation accomplished by "the leaves" of conservation assistance is worth to the country many times the amount spent to assist farmers.

Figured in terms of conservation accomplished, and what would have happened had no assistance been given and the land had been allowed to erode and wear out, the investment already has paid off many times over.

Assistance under the program is available to all farmers. The money appropriated by Congress for program assistance is divided among the 48 States and Alaska, Hawaii, Puerto Rico, and the Virgin Islands. The division, under general provisions, is made in accordance with conservation needs, number and size of farms, and acreage of cropland, pasture, and timber.

Program authorization precedes the actual appropriation of funds. The amount authorized is allocated and the program set up on the basis of the authorization.

Allocations to the counties within a State are made by the State P.M.A. Committee on about the same basis as the allocations to the States; i.e., conservation needs, number of farms, size of farms, acreage of cropland, timber, and pasture. County committeemen then have the responsibility of using these funds to get the most

State or Territory	1949 Allocation (\$1,000) ¹	State or Territory	1949 Allocation (\$1,000) ¹	State or Territory	1949 Allocation (\$1,000) ¹
Alabama	\$ 6,685	Iowa	8,371	New Hampshire	394
Alaska	—	Kansas	7,380	New Jersey	764
Arizona	1,292	Kentucky	5,035	New Mexico	1,881
Arkansas	4,850	Louisiana	4,333	New York	4,564
California	4,938	Maine	797	North Carolina	6,550
Colorado	3,529	Maryland	1,372	North Dakota	4,790
Connecticut	406	Massachusetts	532	Ohio	5,408
Delaware	352	Michigan	4,402	Oklahoma	7,511
Florida	2,001	Minnesota	5,641	Pennsylvania	21,100
Georgia	6,769	Mississippi	6,110	Puerto Rico	963
Territory of Hawaii	164	Missouri	7,706	Rhode Island	83
Idaho	1,763	Montana	3,579	South Carolina	3,493
Illinois	8,310	Nebraska	5,797	South Dakota	4,990
Indiana	4,441	Nevada	223	Total	\$198,800

Funds authorized but not appropriated, as allocated to States for 1949

AGSTONE

conservation they can for each dollar used.

Basis for Allocations

As set forth in the 1949 list of National Practices, the policy established under the Agricultural Conservation Program is as follows:

1. Include only those practices that are badly needed. Too many critical things are needed for money to be used on other practices.

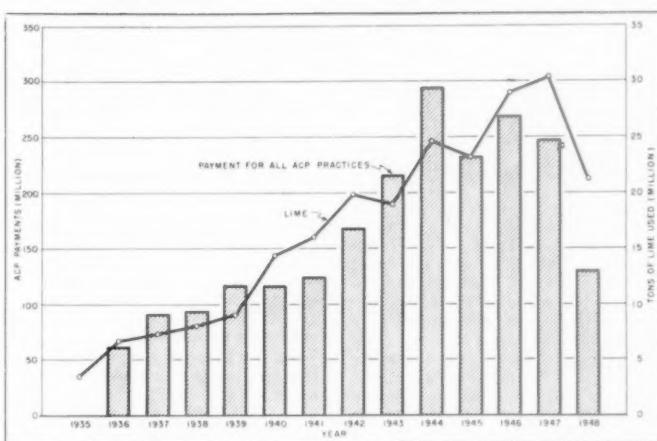
2. Include only practices that most farmers can't or won't do without help. Buy more conservation with every dollar.

3. Pay from public funds only that part of the cost of each practice that has to be paid to get it done. Share the cost of conservation with the farmer—but be thrifty about it.

4. Full responsibility rests on each State and county committee to choose for its farms a program that best fits their conditions.

5. Use the cooperation of the available technical people fully in program making. Combine the best in practice and science through the working together of farmer committeemen and specialists.

Our agricultural resources, unlike most natural resources, can be used and at the same time restored or improved. Conservation of coal or iron consists of preventing waste and making the best use of the supply as long as it lasts. Conservation of soil, range, and woodland, however, is this, and more. It is the wise and skillful



Payment for all A.C.P. practices and liming materials used: 1936—1948

management of these resources so that is possible because, fortunately, the they continue to yield indefinitely. This soil is highly complex and varied substance which builds itself from many sources.

Conservation of agricultural resources is not a simple matter of doing one thing. To be successful, a conservation program must fit in and be a part of the over-all operations of the farm or ranch. It cannot be considered separately from crop and

livestock production. Conservation is a combination of many things. It is the carrying on of the whole farming operation in such a way as to leave the soil or the range better than before—or at least no worse. It is farming and handling the soil and water resources so that the farm stays productive—or becomes more productive. Conservation is a continuing process. It is the way the farm is operated, today, tomorrow, and in the years to come.

Then, too, the conservation needs of each farm differ from those of another farm according to soil type, the extent to which the soil has been depleted or eroded, the subsoil which underlies the topsoil, climatic factors—rainfall, temperature, wind—the crops grown, topography and location, and many other factors.

The use of liming materials or phosphate is a part of the picture—an important part, but not the whole picture. Agstone and phosphate provide a favorable condition for the growth of legumes and grass. This combination; agricultural limestone, phosphate, clover, grass, checks erosion, improves the tilth of the soil and builds for continued production.

When a farmer uses limestone he is helping to provide food and improve the living standards of the people of this country. He is growing greener pastures, which produce more milk and meat and mean a better living for himself and his family. He is not just spreading so many tons of lime.

That is why it is so important that the liming material or phosphate or potash be just as effective as possible in helping to increase the productivity of the land. Results count.

Now that farm prices are coming down, farmers may not be inclined to purchase as much agstone and phos-

Year	Millions Tons of Liming Material Used	Gross Farm Income ¹ Billions of Dollars	A.C.P. Payments for Practices Millions of Dollars
1917	1.8	13.1	—
1918	1.7	16.2	—
1919	2.1	17.7	—
1920	1.9	16.9	—
1921	1.8	10.5	—
1922	1.7	10.9	—
1923	1.6	12.0	—
1924	1.6	12.6	—
1925	2.3	13.6	—
1926	2.2	13.2	—
1927	2.6	13.8	—
1928	2.6	13.5	—
1929	3.8	13.8	—
1930	3.6	11.4	—
1931	2.6	8.4	—
1932	1.8	6.4	—
1933	1.5	7.1	—
1934	2.7	8.5	—
1935	3.5	9.6	—
1936	6.6	10.6	61
1937	7.2	11.8	91
1938	7.9	10.1	94
1939	9.1	10.5	117
1940	14.4	11.0	116
1941	15.9	13.9	124
1942	19.8	18.6	168
1943	18.9	23.0	218
1944	24.6	24.2	294
1945	23.1	25.4	251
1946	28.9	28.9	261
1947	30.3	34.7	241
1948	21.2 ²	34.6 ²	130

¹ Includes Government payments

² Est. October, 1948

Total liming materials used, gross farm income and total assistance for A.C.P. practices: 1917—1948

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	Annual Limestone Needs (Million tons)	Amt. Used in 1947 under A.C.P. (Million tons)
Acre Mc., N.H., Vt., Mass., R.I., Conn., N.Y., N.J., Penn.	6	2.5
Ohio, Ind., Ill., Mich., Wis., Minn., Iowa, Mo., N.D., S.D., Nebr., Kan.	35	20.5
Del., Md., Va., W. Va., N.C., S.C., Ga., Fla., Ky., Tenn., Ala., Miss., Ark., La., Okla., Tex., Mont., Utah, Colo., N.Mex., Ariz., Nev., Calif., Idaho, Wash., Ore., Wyo.	10.5	3.3
	.5	.19

phate as they have in the past few years. The need can be expected to be even greater, however. For, if the bins and cribs fill up and run over, there will be need to divert acreage from cultivated crops to conserving crops, such as grass and legumes.

Seed for grass and legumes is in short supply. We can't afford to waste any. We need the best possible growth from the seed planted. More liming materials and phosphate will be needed to improve the growth of these increased acres of pasture, meadow, and green manure crops.

Data on the use of lime indicate a rather close relationship between farm income and the amount used, and also between the assistance provided under the Agricultural Conservation Program and the amount used. The accompanying table and charts show this relationship.

Use of Liming Materials

The record shows that we used around 30 million tons of liming materials annually in the 1946-47 period. Even then we were using only about half enough to meet the needs as estimated by County Agricultural Conservation Committees, in a county-by-county survey. And in the future this estimate may have to be raised. There is only so much land, and our population is increasing. Eventually, our limited acres will have to produce more.

I have been asked how much agstone will be used this year. Frankly, we do not know. The figures for 1948 give a rather striking illustration of the apparent relationship between A.C.P. assistance and the amount of lime applied. Although farm income last year was only fractionally below the 1947 level, total assistance available under A.C.P. was down sharply, and agricultural limestone use fell off to just over 20 million tons.

Congress authorized an increase in funds for the 1949 program, and it is reasonable to expect that lime use will show an increase. With a better understanding of the need for lime and an increase in program assistance, some observers think use of liming materials may move back toward the 30-million ton record. It should be remembered, however, that A.C.P. funds are not back to the 1946 level, and that farm prices and income are expected to be down somewhat.

As I have indicated before, our service to the farmer must be more than just so many tons of agricultural limestone or other material, or so many acres seeded to cover crops. We must be sure that these practices are fully effective in accomplishing what they are intended to accomplish.

To get the job done, and be sure that we are ready to meet the future needs of the country for food and fiber, all agencies and services must continue to work closely together. Our scientists are constantly developing new information. We must see that this information is used efficiently, as plans are made to carry out the needed conservation programs.

The increased emphasis on soil testing is very important in this

connection. Through the years, we have all become more and more aware of the specific differences in the needs of various soils. Soil testing shows not only whether lime is needed for a particular soil, but also the needs for phosphorus, potash, or nitrogen in planning an efficient fertilizer program. Studies are showing more clearly the interdependence of all mineral elements, and the need for balanced application to insure maximum results.

In a number of States, county and community A.C.P. committeemen now take individual soil samples and see that they are sent to State soil laboratories for analysis and recommendation. This is in line with the policy of working toward the greatest possible accuracy in directing A.C.P. program assistance at established needs in each area and on each farm. In fact, the taking of soil samples for testing might in time be regarded as a general prerequisite for program assistance of this kind.

(Continued on page 157)

REGION AND STATE	CHEMICAL CALCIUM CARBONATE EQUIV. %	ANALYSIS		
		PRIMARY REQUIREMENT FOR PASSING THROUGH MESH SIEVE %—MESH	MECHANICAL	
			%—MESH	
EAST CENTRAL				
Delaware	90	98—10	25—100	
Maryland	90	100—10		
Virginia	85	100—10		
West Virginia	85	90—10		
North Carolina	85	99—10		
Kentucky	80*	80—10*		
Tennessee	85	85—10		
NORTHEAST				
Maine	89.2	98—20	40—100	
New Hampshire	89.2	98—20	40—100	
Vermont	89.2	98—20	40—100	
Massachusetts	89.2	98—20	40—100	
Rhode Island	89.2	98—20	40—100	
Connecticut	89.2	98—20	40—100	
New York	89.2	98—20	40—100	
New Jersey	89.2	98—20	40—100	
Pennsylvania	89.2	98—20	40—100	
NORTH CENTRAL				
Illinois	80*	80—8*	96—4	
Indiana	80*	80—8*	96—4	
Iowa	80	80—8*	20—100	
Michigan	80*	80—8*	20—100	
Minnesota	80*	80—8*		
Missouri	80	90—8		
Ohio	80*	80—8*	20—100	
Wisconsin	80*	80—8*	20—100	
SOUTHERN				
Alabama	90	90—10	50—60	
Arkansas	85	98—10	50—60	
Florida : Calcite	90	90—10	40—100	
Dolomite	89	90—10	40—100	
Georgia	85	90—10	40—100	
Louisiana	90	90—8	30—100	
Mississippi	80	90—8	100—120	
Oklahoma	80	30—60	40—100	
South Carolina	88	90—10	30—40	
Texas	90	75—10	15—100	
WESTERN				
Kansas	80	90—8	25—100	
Oregon	80	90—8	20—100	
Washington	88	100—10		

*Product of the percentage of calcium carbonate equivalent times the percentage through the mesh sieve indicated must be at least 0.72.

NOTE: All States in the Northeast region require 50% total oxide neutralizing equivalent . . . which . . . converted to calcium carbonate equivalent . . . is 89.2%.

Standard ground limestone—bulk chemical and mechanical analysis requirements by states under the A.C.P.

Legislation

Agricultural Limestone Producers Association Holds 4th Meet in Iowa

Largest meeting of this state group, held at Des Moines, emphasized local and national legislation, as well as merchandising

THE FOURTH annual convention of the Iowa Agricultural Limestone Association, held March 9 and 10 in Des Moines, went a long way to prove how strong a state organization can grow in four years. A total of 265 members and guests attended the annual buffet supper and dance that has become the social high-light of this annual meet.

Meetings of the board of directors, the resolutions committee, and the nominating committee took up the first day. General registration commenced on the morning of the second day on the mezzanine floor of the Hotel Savery.

Outgoing president Don Kaser presided at all the formal meetings and gave a welcoming address to open the convention. He congratulated members of the board for attending board meetings so well in the year just over, and made the statement that most members had been present for almost all meetings. Mr. Kaser outlined work ahead for the Association in the coming year as having to do mainly with legislation, both national and local. Two other important phases of Association work in the coming year

will be stressing agricultural limestone merchandising and safety programs.

Association Progress

Association progress in the past year was reported on by Clint Allen, executive secretary and treasurer. He mentioned the many regional meetings in which he had taken part throughout the state, and told that to many of these meetings he had taken the Phillips Petroleum Co. film, "On the Other Side of the Fence." This film is a marvelous piece of documentation of the need of our soil for agricultural limestone. Mr. Allen presented figures to the membership on numbers of pieces of literature distributed in the past year, together with examples of letters written to farmers, urging them to write to their congressmen in support of legislation favorable to the national conservation program.

In closing his report, Mr. Allen showed three "trailers" that had been prepared by the Association. These are available to members for showing in their local theatres, and deal with all phases of agricultural limestone production, processing and spreading.

The following two reports, given by W. F. Sharpe and R. H. Schneekloth, covered the recent conventions of the Agricultural Limestone Institute and the National Agricultural Limestone Association, respectively. A full report on the former meeting will be found elsewhere in this issue and a report on the latter will be found in the March, 1948 issue of ROCK PRODUCTS, page 106.

Lee Paige, chairman of the resolutions committee, next read several resolutions that were unanimously adopted by the members. Most important, from the standpoint of national interest, was the Association's adoption of the resolution adopted a week earlier at the annual convention of the Agricultural Limestone Institute. (This resolution is reported in full elsewhere in this issue and concerned itself with the wording of the farm bill so that money appropriated for conservation purposes could not get side-tracked into some other department.)

New Officers

The nominating committee report was next presented to the group by W. D. Dillon. The members nominated and unanimously elected to the board of directors were: Floyd H. Millen, Farmington Gravel Co., Farmington; Robert Frampton, Sargent Brothers, Des Moines; and Lee R. Paige, Beu & Sons, Grundy Center. Later in the day the board of directors elected officers for the coming year as follows: L. R. Falk St. Ansgar, president; and Ray Cook, Sr., Ray Cook Construction Co., Ames, vice-president.

Following the Association business meetings, a short recess was called, after which a formal luncheon was held in the Grand Ball Room. At the same time, a special luncheon was arranged for the wives of members at a restaurant near the hotel.

First speaker at the luncheon was Arthur Brayton of the Des Moines Chamber of Commerce. Next, W. S. Beardsley, Governor of Iowa, spoke briefly on conservation and particularly liming materials, and their relation to the welfare of the United States.

(Continued on page 108)



Left to right at the registration table, being signed in by Mrs. C. A. Allen, are: Ray Cook, Ray Cook Construction Co., Ames, newly elected vice-president of the association; John J. Stark, John Stark Co., Girard, Kan.; and Horace M. Krause, Columbia Quarry Co., St. Louis, Mo. Mr. Krause had been reelected president of the Agricultural Limestone Institute, in convention at Chicago, just one week before this picture was taken.

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Newly elected president for the coming year is L. R. "Vern" Folk, St. Ansgar



Newly elected members of the board of directors, left to right: Lee R. Paige, Beau & Sons, Grundy Center; Floyd H. Millen, Farmington Gravel Co., Farmington; and Robert E. Frampton, Sargent Brothers, Inc., Des Moines

Luncheon Speaker

Featured speaker at the luncheon was Edmund T. Price, president, Solar Aircraft Co., San Diego, Calif. Title of Mr. Price's paper was "The Forgotten Man"—and it dealt primarily with the American heritage of freedom and the "entrepreneur" it generated. The risk-taker, the individual, is the new forgotten man, according to Mr. Price.

First speaker on the afternoon program was John Coverdale, director, agricultural bureau, Rath Packing Co., Waterloo; and president, Iowa Good Roads Association. Mr. Coverdale stated that the soil is now being depleted twice as fast as in prewar years, and that therefore it is necessary to accelerate soil conservation practices. He drew a parallel between a bank and the soil: "We can't only make withdrawals from the bank

(take crops from the soil); but we must also make deposits (put manures, fertilizers, minerals, etc., back into the soils).

Claude Coykendall, executive secretary, Iowa Good Roads Association, next spoke on problems of local road building legislation. He mentioned three things necessary for a good road program as: 1, proper laws; 2, adequate finances; and 3, sound administration. Jack Reid, assistant administrative engineer, State Highway Administration, spoke on contracts awarded and to be awarded.

Agricultural Review

Otis Liitwagger, state committee-man, Production and Marketing Administration, gave a brief review of the agricultural development of the United States. This development was summarized in three periods: 1, new or virgin soil; 2, industrial develop-

ment; and 3, governmental cooperation in soil conservation. This last, of course, is the present period.

Open Forum

Closing item of the afternoon business session was a general discussion, listed as open to members and associate members and dealing with problems concerning the industry. Mr. Kaser started the discussion by saying that the board of directors had discussed the possibility of a seismograph being purchased by the Association to aid member companies involved in law suits brought over vibration caused by blasting. A spirited discussion was invoked over the question of whether or not contract haulers (spreader truck operators) fell under workmen's compensation insurance. Several members told of their experience in the matter; and the general consensus seemed to be that contract haulers,



Relaxing before the evening festivities, left to right, are: H. E. Millen, Farmington Gravel Co., Farmington; Paul Neuman, Dubuque Stone Products Co., Dubuque; and S. B. Stuck, Grand River Limestone Co., Grand River



Leo Bruening, Bruening Rock Products, Inc., Decorah, left, and W. M. "Bill" Pedely, Mason City, were snapped while holding the stairs



Many wives attended the convention, as is testified by the three pictures here. (Left to right) are: Mrs. Leslie Leas, Mrs. Robert Hicklin and Mrs. Ray Hardesty.

under certain circumstances, can be classed as sub-contractors, and therefore the quarry operator is not liable for workmen's compensation insurance in these cases.

A short meeting of the new board of directors was held after the last meeting of the convention, which in turn was followed by a buffet dinner. The dinner and dance band provided for entertainment afterwards were arranged for by about 26 associate members of the Association—equipment manufacturers and distributors in Iowa.

Additional Rulings to Bay Ridge Regulations

IN A LETTER to member companies, National Industrial Sand Association has included a memorandum from Charles A. Horsky, association counsel, covering additional rulings to the Bay Ridge regulations issued by the Administrator of the Wage and Hour Division. Because of the growing practice in the industrial sand industry to pay straight time for certain holidays even though not actually worked, with double time if worked, Mr. Horsky covered first a new policy on this subject. Originally the rule was that the whole of such double time must be taken into account in determination of the regular rate of pay for the work-week in which the holiday falls. Now in the event of work actually performed on the holiday, only the straight-time rate need be taken into account in calculating the regular rate of pay.

Other clarifications given in Mr. Horsky's memorandum include: If a holiday falls on Saturday or Sunday of a work week beginning on Monday, and work is performed on that holiday under a premium-time practice, all of the money earned that day must be included in the regular rate of pay; in other words, the "6th day and the 7th day worked" principle in such an instance will not apply.

Under the normal situation in the industrial sand industry, premium pay

for work done before a certain hour in the morning is true overtime and is not part of the regular rate, except that such early morning work on Monday, the first day of the work week, is regarded as part of the regular rate of pay. Premium pay for work done in excess of a certain number of hours in the work-day is true overtime and not part of the regular rate of pay.

In Mr. Horsky's words, "With respect to holiday premiums, the rule now is as follows: Where an employee is paid for holidays even though they are not worked, that amount of course need not be included in computing the regular rate for overtime purposes, since it is paid for time not worked. In addition, however, if the employee works on the holiday and is paid an additional amount equal to at least his straight time rate for working on the holiday, the amount which is to be included in computing the regular rate is only the additional amount he is paid for working."

Present Views on Agricultural Program

IN A LETTER to member companies from the National Agricultural Limestone Association, Inc., it is stated that consensus of opinion with regard to the recent election, shows that appropriations for the Agricultural Conservation Program should not only be easier to obtain, but that the amount will be increased both for administration and for carrying out actual practices.

"From the standpoint of the Agricultural Conservation Program, the election removes all doubt that there will be any question about the \$262,500,000 authorized by the last Congress being appropriated by the new Congress," the letter reads. There is also little question that \$300,000,000 will be provided for the 1950 program and that at least this amount will be authorized for the 1951 program. If Congress remains Democratic dur-

ing the last two years of the President's new term, \$400,000,000 will be a minimum for the 1952 and 1953 programs. It was further stated:

"Of particular interest in connection with Agricultural Conservation appropriations is the fact that Mr. Tabor of New York who has always violently opposed our program, will be succeeded as chairman of the House Appropriations Committee by Clarence Cannon of Missouri who has always been our most outspoken advocate. The Appropriations Sub-Committee on Agriculture will be headed by Jamie L. Whitten of Mississippi, another strong advocate of our program."

Tax legislation may be introduced, but it is expected that it will lower the rates of the lower income groups and increase it in the higher income groups. Percentage depletion for the industry probably is still far remote. The tax bill which passed the last House but which did not receive Senate action and which included consideration of depletion for several industries is probably dead.

Increased Production of Abrasive Materials

DEMANDS for abrasive materials increased substantially in 1947, according to the Bureau of Mines, with new sales records established for ground sand and sandstone, pumice, pumicite, and metallic abrasives. Sales of ground sand and sandstone in 1947 increased 13 percent to 651,120 tons valued at \$5,181,113. Pumice and pumicite sold or used principally for aggregate or abrasive purposes, jumped 36 percent. Sales of diatomite and quartz indicated active markets. Tonnage of tripoli marketed in 1947 was the largest since 1937 and the value highest yet recorded. Sales of grinding pebbles increased 26 percent over 1946.

Cover Picture Depicts Trends in Rock Industry

THIS MONTH'S cover picture graphically illustrates two trends in the rock products industries: surge piles and use of belt conveyors for material movement. The use of surge piles, usually between the primary and secondary breaker, is being recognized more and more as a positive guard against surges in plant feed. Belt conveyors are an integral part of a surge pile system; and also are being used more widely for inter-plant or pit-to-plant material movement.

Safety in Sandblasting

NATIONAL INDUSTRIAL SAND ASSOCIATION, Washington, D. C., announces that its booklet "Safety in Sandblasting—a manual" is being revised.

Calcining



In center foreground is 4-compartment silo for burned lime; at left is 4-compartment silo for partially pulverized crude rock. Silo to the right is for milled products. In between silos, to the right, is the hydrator

At Cleburne, Texas, Limestone Products Co., recently started operations in a new lime plant designed for a five-fold expansion, should demands require, without rebuilding or changing existing arrangements of major equipment. The new plant produces burned lime, hydrated lime, mason's lime, and related products as well as various limestone products from agricultural limestone to finely pulverized limestone.

This new enterprise serves the fast growing Ft. Worth, Dallas, and Waco, Texas, areas as it is strategically located to reach all these markets and more distant territories. It is locally owned with J. Lambert Lain, the company's organizer, as president. Associated with Mr. Lain is Mr. W. E. Abbas of the City National Bank of

Cleburne. We are indebted to Mr. Lain for permission to inspect this neat and efficient plant, the output of which is unquestionably of high quality and will find a wide variety of uses in the areas served.

Essentially, the plant can be divided longitudinally into two sections; on one side is the processing equipment for handling the burned lime, hydrated lime, pulverized quicklime, etc. These various items of equipment are arranged in a straight line. In the other section is the equipment for preparing the various limestone products, and the processing equipment there also is arranged very largely in a straight line. Between these two sections are the lime kilns with ample room at one end for adding more kilns as the need presents itself. The plant

is of steel and concrete construction throughout. Some concrete blocks are used for housing some of the machinery items. All sources of dust generation are enclosed so that the plant will be easily kept clean and operating to top efficiency.

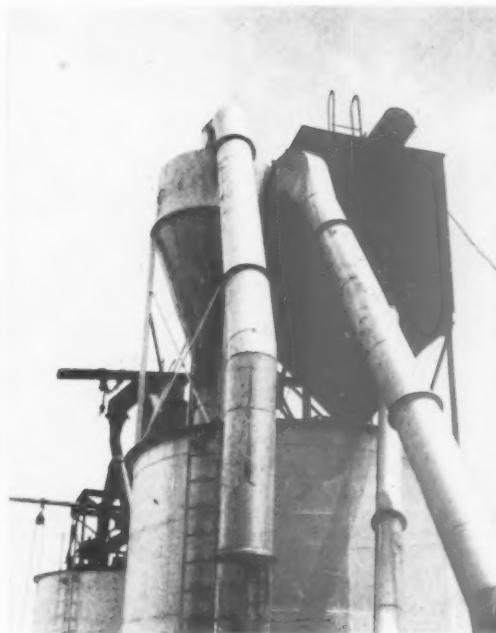
Kiln Details

Lay-out of the plant is such that the various lime and limestone products can be loaded to cars or trucks either in sacks or in bulk. Tracks serving the plant have been laid out to parallel both sides of the main plant and one of the tracks also serves the warehouse. Trucks can also be easily loaded. Two main arterial highways parallel the site with a highway on each side.

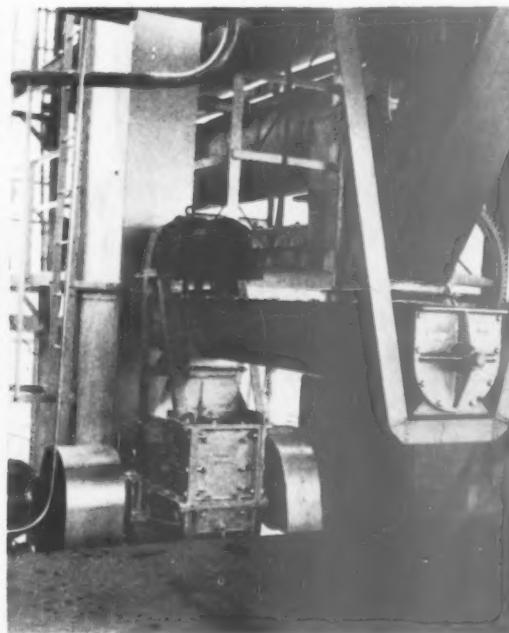
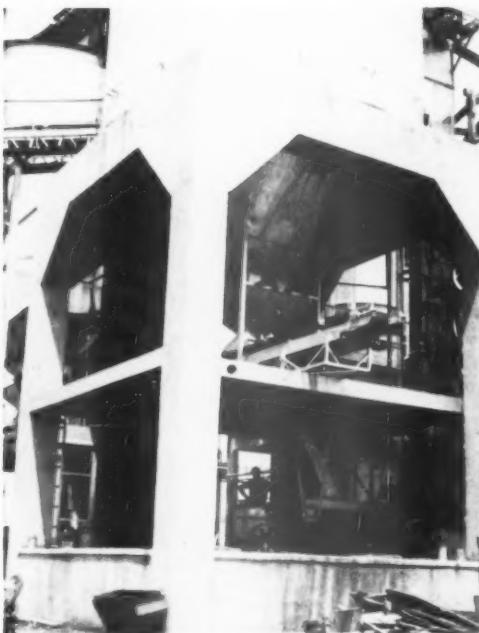
Lime kilns or "producers" as they



View of storage facilities for rock with shuttle conveyor above, and reclaiming conveyor below, inclining up to plant in the background



Left: In center may be seen steel bins over one of the lime kilns with the shuttle conveyor, above, feeding it. Right: To the left is the cyclone serving the mill and alongside is the bag filter collector which follows the cyclone. Both discharge to the steel silo below



Left: Short conveyor, above, receives burned lime for bulk car loading; below is the screw conveyor serving the swing hammer mill. Right: Lime going to hydrator is spouted to a short screw conveyor serving the hammer mill. Elevator receives mill discharge

Pulverizing, Screening, and Packing

The handling of the burned lime, in essence, consists of screening to three sizes, on a Hum-mer screen, bulk or bag loading of these sizes, or they may be given a preliminary pulverizing in a Jeffrey swing hammer mill, followed by hydration in a Lecon hydrator. The hydrated product is then ground in a Raymond mill augmented by a Kennedy-Van Saun tube mill and the two separate products sacked with St. Regis packers.

On the raw lime side, the salient features are: pulverizing in a second Jeffrey hammer mill to 3/16-in.; sizing of the stone to four sizes with a Hum-mer screen; bulk or bag loading of the products; or the stone may be further pulverized in a second Kennedy-Van Saun tube mill for preparing the finer grades of pulverized limestone. In this section of the plant, provisions are available so that the tube mill can be used for preparing finely ground quicklime. On both the burned lime and the limestone fine grinding sections, Norblu dust filters are provided. These units follow collectors of the cyclone type and take care of any dust that otherwise might be lost in the vented air. Both the finely ground limestone and the ground quicklime are sacked in St. Regis packers. The plant uses six of these packers at six different locations.

Two novel features of the hydrating and grinding plant for this section are the use of a pug mill ahead of the



Stockpiling facilities at quarry. Note truck loading conveyor projecting out from concrete abutment portal

are here referred to, were designed by W. R. Cliffe, consulting engineer of L.I.M.E., Hershey, Penn., and are said to be the first of their kind installed anywhere. They were supplied by Lime Equipment Co., Lebanon, Penn. There are at present two of these units each of which produces 10 tons of lime per 24 hours. Each lime producer comprises a steel silo, holding a 24-hr. supply of sized limestone, which is located over the calcining unit. The kilns, fired by natural gas, feature a pre-heating zone, a calcining zone, a seasoning zone, a cooler zone and a reciprocating discharge gate assembly that functions through a variable speed drive. The cooled lime falls to

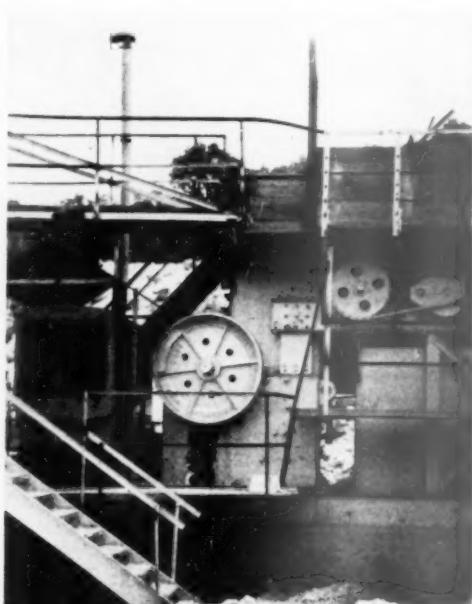
an apron conveyor. The kilns are relatively small and require less than 60 sq. ft. of floor area. Each kiln has an induced draft fan that delivers to a small Buell dust collector, located alongside each kiln. Later the owners plan to add ten more of these kiln units.

Burn Natural Gas

Natural gas burners operate under 12 p.s.i. Each kiln consumes 2100 cu. ft. of 1040-B.t.u. gas per hour. On this basis, fuel input is at the rate of approximately 5,000,000 B.t.u. per ton of lime. The kilns operate under approximately 3-in. of mercury pressure, and the gas exit temperatures are about 400 deg. F.



Left: Shuttle belt at quarry. Assembly is moved by a rope and "gypsy head" on tail pulley. Right: Diesel engine drives 36- x 42-in. jaw crusher



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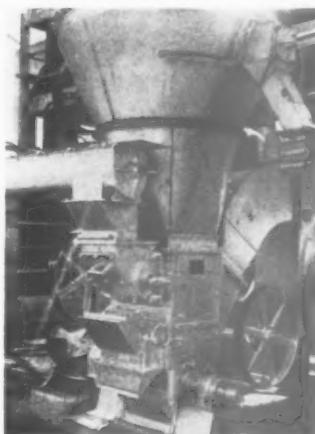
hydrators, with the tailings from the Raymond pulverizer being used as the feed material to the Kennedy-Van Saun tube mill in that section of the plant.

Hydrating Section

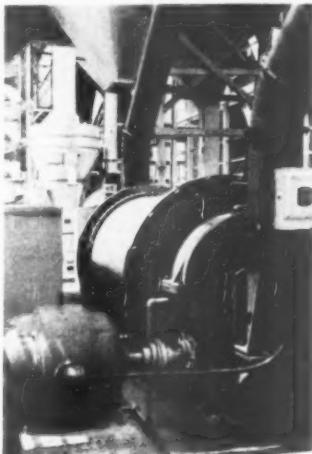
In detail, the flow of material through the hydrating section is as follows: The burned lime falls from the two kilns to an apron conveyor installed under the structural steel supporting legs of the lime producers. This conveyor discharges to a steel hopper serving a Link-Belt elevator that elevates the lime to the top of the plant and distributes over a two-deck, 3- x 5-ft. Hum-mer vibrating screen. This screen is mounted over a four-compartment steel bin, 20 ft. in diameter and 24 ft. high, which is erected on top of a concrete masonry structure of sufficient height that a 2-tube, St. Regis packer can be operated under it and the sacked material trucked to cars, if desired. Or, a short shuttle conveyor can load to cars or trucks. The elevator is so laid out that it can deliver to a small lime storage bin over the Kennedy-Van Saun tube mill in the ground limestone section. This enables the operators to use that equipment to grind a fine quicklime.

Tracing the flow from the 4-compartment bin, the arrangement of equipment is as follows: its contents may be fed to a short screw conveyor that delivers to a 20 by 12, Type A-2, Jeffrey swing hammer mill directly connected to a 25-hp. Westinghouse motor. The hammer mill delivers to a second Link-Belt elevator that elevates the lime to a small surge bin and to the pug mill mounted above the hydrator. The pug mill is fed by a Hardinge volumetric feeder. The hydrator, a model 6-B, Leco, 6-cycle with a rated capacity 6 t.p.h., unloads to a screw conveyor that routes the material to a Raymond mill equipped with a whiz-

zer separator. The whizzer uses a 10-hp. Westinghouse motor and the fan on the Raymond mill takes a 40-hp. Master Electric Co. motor. The Raymond mill uses a 25-hp. motor. Finer portions from the whizzer go to a cyclone collector mounted over a steel cylindrical silo and the vented air from the cyclone goes to a Norblo dust collector mounted alongside the cyclone. Both discharge their products to the same silo. The silo discharges to a 2-tube St. Regis packer. Tailings from the Raymond mill fall to a belt conveyor that delivers to a 4- x 6-ft. Kennedy-Van Saun, air-swept, tube mill. This mill is driven by a 30-hp. Westinghouse motor through a right-angled drive and a Falk coupling. The tube mill's air borne material is collected in a cyclone mounted over another cylindrical steel silo. Under



Fine grinding mill with whizzer separator



Left: Air-swept tube mill which is employed on the burned lime side of the installation

this silo a 2-tube St. Regis packer also has been installed.

Raw Limestone Processing

Material from the ground storage pile is elevated to the top of the plant via an 18-in. belt conveyor that can serve the kilns or the raw limestone preparation section. If for the latter purpose, the stone falls to a steel hopper. The stone in this steel hopper passes to an 18- x 24-in., Type A-2, Jeffrey swing hammer mill directly connected to a 25-hp. Robbins and Myers electric motor. This pulverizing unit, it will be noted, is slightly larger than the one used on the lime side but uses the same horsepower. Sufficient head room has been allowed ahead of the steel hopper serving the hammer mill to later install a dryer that will use waste heat from the kilns. The Jeffrey bucket elevator delivers to a 3-deck, 3- x 10-ft. Hum-mer vibrating

screen that prepares four sizes of material; plus 3/16-in.; minus 3/16-in., plus 10-mesh; minus 10-mesh, plus 20-mesh; and minus 20-mesh. These materials fall to a four-compartment, 20- x 24-ft., steel cylindrical silo. It is mounted in a similar manner to the quadrant-arranged silo in the lime section. The silo can discharge to a St. Regis packer, to a shuttle belt for open top or enclosed car loading, or to a feeder ahead of the 4- x 6-ft. Kennedy-Van Saun, air-swept tube mill. The feeder is driven by a U. S. motor. The Kennedy-Van Saun tube mill delivers to a cyclone collector followed by a Norblo dust collector which discharges to a steel silo. Here the set-up is such that burned lime can be ground and collected with this same equipment, and in this event the pulverized material is chuted to another steel silo alongside the one mentioned above. Both these silos are 16- x 20-ft. and have packers installed below. The burned lime products are marked under the trade name of "Cleburn" and the processed limestone is named "Texrock." The plant and quarry employ 25 men.



Below: Feeder serving the tube mill on the raw limestone side



One of two dust collectors that remove stack dust. Induced draft fan on each kiln exhausts to one of these collectors

Limestone



Horace Krause, Columbia Quarry Co., re-elected president of the Agricultural Limestone Institute at Chicago meeting

FOURTH ANNUAL convention of the Agricultural Limestone Institute, a division of the National Crushed Stone Association, was the largest and had the best program of any of the annual meetings to date. Over 225 members and guests attended the convention, at Chicago's Edgewater Beach Hotel, February 21 and 22, to hear papers on legislation, promotion and merchandising; and to participate in the Institute's first open forum for informal discussion of plant operating problems.

The program featured two special luncheons, with renowned speakers; a cocktail party, and a buffet supper as the social event of the meeting.

Officers

Horace C. Krause, president of Columbia Quarry Co., St. Louis, Mo., was reelected president of the Agricultural Limestone Institute and given a vote of thanks for his aggressive leadership of the organization in 1948. Following is listed the complete Board of Directors together with the regional vice-presidents:

Northeast Region: H. D. Brigstock (vice-president), Thomasville Stone & Lime Co., Thomasville, Penn.; Harry E. Battin, Jr., Callanan Road Improvement Co., South Bethlehem, N. Y.; Otho M. Graves, General Crushed Stone Co., Easton, Penn.

East Central Region: John R. Rice (vice-president), Liberty Limestone Corp., Buchanan, Va.; C. A. Bernard, American Limestone Co., St. Louis, Mo.; W. F. Childs 3rd, Harry T. Campbell Sons' Corp., Towson, Md.; S. B. Downing, Jr., Central Rock Co., Lexington, Ky.; Verne C. Morgan, Kentucky Stone Co., Inc., Louisville, Ky.; B. F. Taylor, Cowan Stone Co., Cowan, Tenn.; F. G. White, M. J. Grove Lime Co., Stephens City, Va.

A. L. I. Holds Fourth Annual Convention

Largest attendance and best program mark 1949 meeting of Agricultural Limestone Institute at Chicago's Edgewater Beach Hotel

North Central Region: W. F. Sharpe (vice-president), Dillon, Sharpe & Co., Columbus Junction, Iowa; W. L. Bryan, Bryan Construction Co., Northfield, Minn.; *H. A. Clark, Consumers Co., Chicago, Ill.; J. L. Fay, Material Service Corp., La Porte, Ind.; *A. K. Hausmann, Kelley Island Lime & Transport Co., Cleveland, Ohio; L. W. Hayes, L. W. Hayes, Inc., Kansas City, Mo.; *P. E. Heim, Carbon Limestone Co., Youngstown, Ohio; W. E. Hewitt, East St. Louis Stone Co., East St. Louis, Ill.; B. G. Lindenfeld, Terminal Materials Co., St. Joseph, Mich.; R. E. Meshberger, Meshberger Stone Co., Inc., Columbus, Ind.; E. V. Meyer, Ed. J. Leary Construction Co., River Falls, Wis.; *S. P. Moore, Concrete Materials & Construction Co., Cedar Rapids, Iowa; Paul M. Nauman, Dubuque Stone Products Co., Dubuque, Iowa; A. Overgaard, A. Overgaard Rock Products, Elroy, Wis.; N. F. Schwarz, Pontiac Stone Co., Decatur, Ill.; W. J. Stoffel, Dolese & Shepard Co., Chicago, Ill.; W. E. Stone, Piqua Stone Products Co., Piqua, Ohio.

Southern Region: C. M. Sims (vice-president), Campbell Limestone Co., Gaffney, S. C.; Chas. E. Baxter, Jr., Batesville White Lime Co., Batesville, Ark.; H. M. Hubbard, Willingham-Little Stone Co., Atlanta, Ga.; *E. V. Scott, Southwest Stone Co., Dallas, Texas.

Western Region: John J. Stark (vice-president), Girard, Kans.; D. P. Thomas, Fort Scott Hydraulic Cement Co., Fort Scott, Kans.; *John H. Riddle, Riddle Quarries, Inc., Marion, Kans.

Representing the National Crushed Stone Associations: *Russell Rarey, Marble Cliff Quarries Co., Columbus 15, Ohio.

Reports

H. C. Krause presided over the opening session, which started with presentation of the three-dimensional color picture of America, "Highway U. S. A." shown through the courtesy of Barber-Greene Co. This film has been shown at many industry conventions and has been widely acclaimed. Following the call to order and greet-

*Serving on Executive Committee.

ings from president Krause, managing director Henry A. Huschke presented his annual report. The program of the institute has been going forward at an increased rate, and with continuing emphasis on merchandising aids toward building sound and substantial business for the membership.

Throughout 1948, Mr. Huschke's office has sent out 28 communications relative to legislative matters in Washington and president Krause has been active in presenting statements to congressional committees on the subject of soil conservation.

Mr. Huschke said that the picture with respect to the appropriation for soil conservation for the 1949 program and the authorization for 1950 appears promising, now that the appropriations subcommittees are in more friendly hands than they were the past two years.

The promotional program of the Institute is being pushed and, from requests for promotional literature received, Mr. Huschke sees a genuine desire for more of that kind of activity. A number of bank ads were made available in 1948 and the series of 15 newspaper ads available for use by members in local newspapers is getting wide use. During 1948,



L. F. Livingston, manager, Extension Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., addressing the group at the last luncheon.

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over 100,000 promotional folders were mailed out. Other promotional aids in demand are the invisible ink post card, "How Big is an Acre," the new 24-page booklet "About Agriculture Limestone" and the Phillips Petroleum Co. motion picture "The Other Side of the Fence" which has been made available for purchase.

For the second time, the Institute had a booth at the National Farm Show at the Coliseum in Chicago, November 27—December 4, 1948, which was financed cooperatively with the Midwest Limestone Institute which paid almost half the total expense.

Miscellaneous activities included the assembly of statistics on the use of liming materials by states in cooperation with the National Lime Association, information letters on many matters, and participation by Mr. Huschke in seven meetings outside Washington. Membership is slightly in excess of 200. Secretary-treasurer J. R. Boyd read the financial report.

Federal Legislation

In a discussion of "Federal Legislation Affecting the Limestone Business," Charles A. Horsky, Washington, D. C., covered all the important laws and prospective changes concerned with labor and pricing.

In opening his discussion, he said that the legislative picture is getting so involved that it is getting to the point where every business man must almost be a lawyer. The American code of laws, he said, is a formidable business today. It is no excuse for a business man to say that the laws are too complicated, he warned, in cautioning that the laws must be understood and there be compliance. In discussing the Wage and Hour Law and the Taft-Hartley Act, he said there is little certainty as to what amendments or changes will come out of Congress. Debates have shown

some sentiment to retain some of the provisions of the Taft-Hartley Act but political influences will govern. Something will come out of Congress, he said, to clarify the computation of overtime under the Wage and Hour Law.

He discussed the Robinson-Patman Act at some length, which applies to selling in interstate commerce, but which, he said, may affect the industry where supplies are bought and moved across state lines. The buyer is equally as liable as the seller.

Mr. Horsky traced the history of legislation against monopolistic practices, in leading up to his discussion of basing point pricing and other methods. It amounted to the fact that any withdrawal of the F.T.C. from its position would mean that all it has fought for over the years would be lost.

He discussed the various common methods of pricing such as zone pricing, single basing points, multiple basing points, etc., and said that a lawyer cannot say if any of them are legal today. The trouble is that treble damages are the penalty, and there is no limitation in time beyond which F.T.C. suits cannot be filed.

In mentioning pricing he said that the F.T.C. says that price is not what the purchaser pays for a commodity but what the seller gets (factory net) under the Robinson-Patman Act. The philosophy is that there is something wrong if the purchaser does not get the benefits of location which he is supposed to be morally and economically entitled to. The F.T.C., he said, thinks of competition only in terms of price. It takes the cement case to be a blanket underwriting of all its theories. The Johnson bill, which would clarify pricing methods, is undergoing some revision, he said, in order to make it more palatable to the F.T.C.



C. H. Duesing, Atlas Powder Co., Joplin, Mo., left, and Richard M. Wile, Inland Lime & Stone Co., Manistique, Mich.

In the discussion which followed Mr. Horsky's talk, it developed that agricultural limestone producers may be termed as under the Wage and Hour Law by virtue of the fact that crops grown on land on which their lime stone has been applied move across state lines.

Long-Range Conservation

S. P. Moore, past-president, presided over the Greeting Luncheon, at which Albert J. Loveland, Under Secretary of Agriculture, Washington, D. C., gave a paper on "The Long-Range Needs of the Agricultural Conservation Program."

Mr. Loveland introduced himself as a farmer and told of his early experience in liming his farm. He predicted a need for continuance of abundant farm production. In 1948, he said that Americans ate 12 percent more food per capita than in the years 1935—1939, and still they failed to get their wants in some foods. American food was pointed to as playing an important role in the world's rehabilitation, exports of food amounting to 20 million tons a year. Last



Under-Secretary of Agriculture, Albert J. Loveland, was guest speaker at greeting luncheon under chairmanship of S. P. Moore



Head table at the luncheon on the last day of the convention. Left to right: J. B. Turner, Fayette County Farm Adviser, Vandalia, Ill.; W. L. Sharpe, Dillon, Sharpe & Co., Columbus Junction, Iowa; W. E. Stone, Piqua Stone Products Co., Piqua, Ohio; L. F. Livingston, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.; John Riddle, Riddle Quarries, Inc., Marion, Kan. (presiding officer at the luncheon); Dr. R. H. Bray, professor of soil fertility, University of Illinois, Urbana, Ill.; Norbert F. Schwartz, Pontiac Stone Co., Decatur, Ill.; C. M. Sims, Campbell Limestone Co., Gaffney, S. C.; and A. K. Hausmann, Kelley Island Lime & Transport Co., Cleveland, Ohio

year's farm output exceeded the 1935—39 average by 41 percent.

In 1933, farmers spread only one and one-half million tons of liming materials. In 1935, the total was three million tons. In 1936, the A.C.P. came into being, and by 1947, the tonnage used on the farms was ten times the 1935 consumption. Economic necessity, he warned, might curtail the use of liming materials which emphasizes the importance of farm prosperity to the agricultural limestone industry.

He commented on the great need for protection of land resources against waste, erosion and depletion. There is a real need for shifting more and more to grassland farming. According to Mr. Loveland, some three million farmers are cooperating in the program and their farms include nearly two-thirds of all our cropland.

Farmers cooperating in the A.C.P. for 1947 applied liming materials to 14½ million acres, for a total of 30 million tons. During the 12 years of the program, 186 million tons have been applied. In light of the growing need for more grassland farming, the need is now 70 million tons a year to maintain a balance on the assumption that sufficient liming materials had been applied to bring the soils into balance.

Proper application has become an important field in agricultural research. Most of the states now are doing experimental work in limestone utilization, including quantity of application and the relative merits of finely ground and coarsely ground products. Use of liming materials with different crops and in various rotations is also being studied as are nutritive effects in foods.

Mr. Loveland urged that the industry encourage the farmers to use available soil tests to determine their optimum liming requirements. The Department of Agriculture hopes to see more progress in marketing on the part of the industry, and its conception is that marketing has to be an educational operation involving some pioneering work. The A.C.P. authorization of 262½ million for the calendar year 1949 should permit an increase in liming operations.

Plant Production Problems

E. V. Scott, Southwest Stone Co., Dallas, Texas, presided over an afternoon session devoted entirely to consideration of plant production problems. Blasting, crushing, grinding and the screening of moist and dry materials were scheduled as the principal topics for discussion, selection having been determined by questionnaires mailed out in advance to the industry.

Jules E. Jenkins, Vibration Measurement Engineers, Chicago, Ill., was the discussion leader on the subject of blasting. Mr. Jenkins confined his remarks principally to split-second delay blasting and the use of scientific methods to minimize complaints and improve blasting efficiency. He told how seismology could be put to use to increase production, and gave specific examples of cases in which there had been complaints of damage from blasting where complaints were eliminated and the permissible size of shots increased as a result of study of vibrations and the application of sound principles. The need for second-

ary blasting was also reduced in these cases, as was the degree of back break.

Discussion developed that best results often came from detonating the blast hole with the largest burden first. Apparently quite a few operators are keeping seismological records of all their blasting.

E. Lee Heidenreich, Jr., Consulting Engineer, Newburgh, N. Y., led the discussion on crushing and grinding. He started by saying that he believed very few producers know the relation of crushing costs to over-all costs and the extent of variations in crusher output as influenced by weather conditions. In commenting on specifications, he said that strict interpretation of specifications, and strict specifications, would benefit the industry by eliminating farmer producers.

In the selection of primary crushers, whether they be jaw crushers, gyratories or single roll crushers, the capacity should be double that of the plant, he said, in order to allow for delays in delivery of stone from the quarry and to compensate for unfavorable weather conditions.

Mr. Heidenreich predicted that



Mr. and Mrs. W. L. Sharpe, right, and W. D. Dillon, Dillon, Sharpe & Co., Columbus Junction, Iowa, snapped just before the afternoon session at which Mr. Sharpe gave the group some pointers on merchandising agricultural limestone.

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there will be many single-roll primary crushers installed in midwestern plants because their performance is good whether the stone be wet or dry. These crushers, he said, are sturdy and suffer comparatively little wear and tear when fed limestone containing as much as 6 or 7 percent silica. He cited some figures to show that production costs, for labor alone, may more than double with wet stone due to decreased tonnage. He suggested that day-by-day cost records might show that the installation of a dryer to handle minus $\frac{3}{4}$ - or 1-in. stone after passage through the primary crusher would be economical. The dryer could be by-passed, of course, in dry weather.

Discussion brought out some experiences with various types of crushers. Apparently, single-roll, all-steel primary crushers are giving satisfactory performance and are easily maintained. W. S. Black, Black White Limestone Co., Quincy, Ill., reported that he is using a 24- x 48-in. McLanahan Stone primary and that there was no drop-off in tonnage when wet stone was crushed. The bigger hammer mills, it was pointed out, are more effective than those of smaller diameter, in crushing wet stone. Successful performance was reported with the New Holland impact crusher by W. D. Dillon, Dillon, Sharpe & Co., Columbus Junction, Iowa.

Mr. Heidenreich pointed out that it was desirable to have a sizing screen between the primary breaker and hammer mill, to remove minus $\frac{1}{8}$ -in. or 20-mesh materials, whichever governs, to increase the output of the hammer mill. Coarse stone is needed in the feed to a hammer mill, he said, in order to pulverize all of it satisfactorily. It was suggested that if a dryer be used, that it be installed after such screen and the fines be put through it. In answer to a question as to whether or not it was necessary to feed stone larger than 2-in. size into a hammer mill, Mr. Heidenreich said that 2- or 3-in. top size, if cleaned of dust, constitutes just as good feed as 5- or 6-in. size stone.

C. E. Hogeboom, Consumers Co., Chicago, Ill., discussed a number of tests to determine screening efficiency in handling stone of various percentages of moisture. Some of the difficulties encountered were adhesion of the materials to the screen, the balling up of fines, and adhesion of small sizes to the larger particles. Number of screen decks required, slopes of screens, surface areas, rate of vibration, etc., were some of the variables considered in experiments he described. Chains applied to screen cloth and rapping balls were tried with no particular success in the prevention of blinding. In one plant studied, varying the throw and speed of a vibrating screen produced best results. In concluding his discussion on screening moist materials, Mr. Hoge-

boom said that the solution seemed to be to apply water and then screen such materials wet.

Joe C. Lawrence, Liberty Limestone Corp., Buchanan, Va., concluded the meeting with brief comments on the pulverization and sizing of dolomitic limestone produced to a fineness of 100 percent minus 10 mesh, with 50—70 percent through a 100-mesh screen. Raymond mills, with circulating heated air, are used.

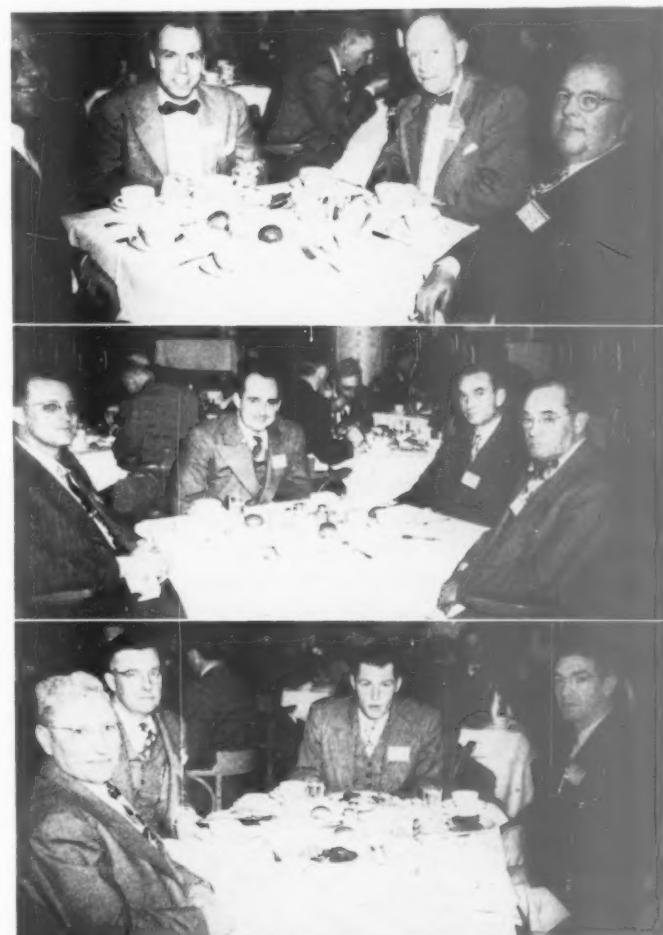
Merchandising

"How we increased the Use of Agricultural Limestone in Our County" was the subject of a talk by J. B.

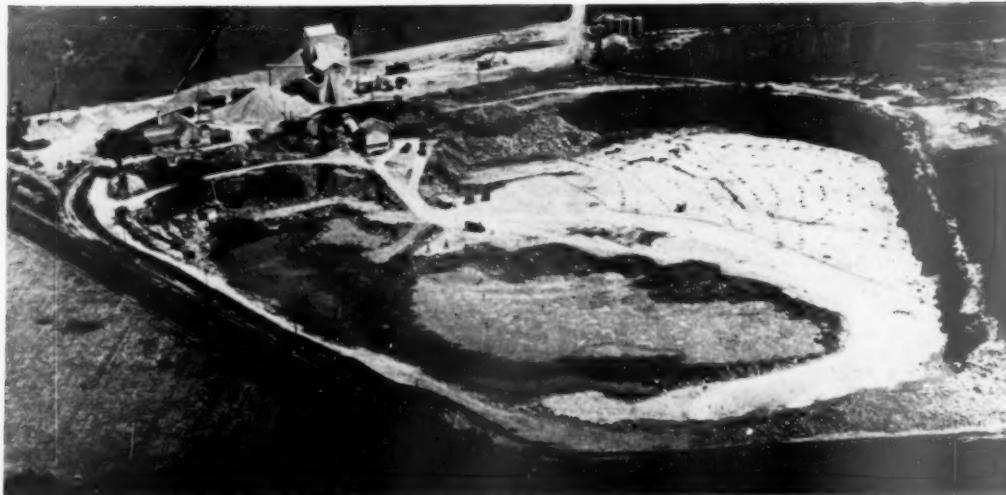
Turner, Fayette County Farm Adviser, Vandalia, Ill. Mr. Turner's talk was illustrated by color slides to show the response of various crops to liming. The three factors essential to get agricultural limestone applied on the farms, he emphasized, are education, economics and ample supply coupled with service. Much of his talk dealt with our absolute dependence on soil fertility and the minerals in the soil for prosperity and, for that matter, survival.

Dr. R. H. Bray, Professor of Soil Fertility, University of Illinois, in his talk "The New Concept of Elastic

(Continued on page 158)



Tables at one of the luncheons. Left to right, top: C. L. Shuster, Dubuque Stone Products Co., Dubuque, Iowa; William F. Childs III, and W. H. Carroll, Harry T. Campbell Sons' Corp., Towson, Md.; and Wayne W. King, W. S. Tyler Co., Cleveland, Ohio. Middle: D. J. Dunn, Manteno Limestone Co., Manteno, Ill.; K. K. Kinsey, V. H. Mussman and S. P. Moore, Concrete Materials & Construction Co., Cedar Rapids, Iowa. Bottom: William J. Gilgenbach, Wilson Rock & Limestone Co., Wilson, Wis.; C. H. Duesing, Atiles Powder Co., Joplin, Mo.; W. H. Gilgenbach, Wilson Rock & Limestone Co.; and Sam Dowding, Central Rock Co., Lexington, Ky.



Aerial view of Lutz Stone Co. quarry; showing plant, upper left, with primary crusher building directly below. Present shovel operation is under ledge, immediate foreground.

Quarrying: From Dimension Stone to Agstone

Lutz Stone Co., Oshkosh, Wis., utilizes delayed-action blasting caps, moves the primary crusher to quarry, has re-crushing capacity to keep plant operation uniform, and steam-cleans all quarry and road equipment every two months

OPENED in 1867, the Lutz Stone Co. quarry first produced building stone. The change to crushed stone was made in 1893, when the first crusher was installed. Next major change came in 1923, when the present crushing and screening plant was built. Since that time there have been many changes and additions to the plant in order to increase plant-flow flexibility, and today, 20 to 25 percent of production is in the form of agricultural limestone. With relocation of a 24-in. gyratory primary crusher on the quarry floor in 1930, quarry-haulage was changed to 6-cu. yd. trucks.

The company was incorporated in 1925, and present officers include: Gertrude K. Lutz, president; E. A. Lutz, vice-president; E. W. Lutz, secretary; and R. W. Lutz, treasurer-general manager. Robert Lutz, founder of the company, died in 1941.

The present quarry covers an area of approximately 14 acres, with equally as much adjacent land for future development. Overburden, 4 to 5 ft.

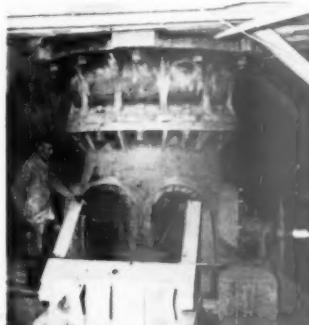
By DAVID MOCINE

deep, is removed with a company-owned power shovel. The overburden is sold locally as fill material. Under the overburden is a 4-ft. stratum of shale rock that is crushed for road stone. Next or bottom stratum is composed of a hard, blue Niagara dolomite, which extends for approximately 100 ft. The deposit on which the quarry is located is reported to extend from Green Bay to Racine, two Wisconsin towns several hundred miles apart, both located on the shore of Lake Michigan.

Blasting

Blast holes are drilled by pneumatic wagon drills, powered by a truck-mounted 500 c.f.m. air compressor. Two inch blast holes are drilled 8 or 12 ft. deep and loaded with 1½- x 8-in., 50 percent, gelatine dynamite sticks. Delayed action caps are used for firing the blast holes which are spaced 5

ft. apart in a staggered pattern with 5-ft. burden. Usual practice is to fire 25 to 30 holes per blast. Formerly the quarry was worked with higher faces, with drilling being accomplished by well drills, but due to the closeness of



Primary crusher, located on quarry floor—a 24-in. gyratory

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the town of Oshkosh, this method had to be abandoned in favor of the smaller charge so as to lessen disturbance. Stone at this site is highly fragmented and little secondary blasting is required.

Primary Crusher Installation

A 1½-cu. yd. diesel-powered shovel loads quarry stone to 6-cu. yd. end-dump trucks for an average haul of 1500 ft. to the primary crusher. The company maintains four of these trucks, with one as standby equipment, as only three are needed for quarry hauling at one time. Located on the quarry floor in a building directly below the main plant, the primary crusher is a 24-in. gyratory type rated at 100-cu. yd. per hr. capacity passing 2½-in. mesh.

Building housing the primary crusher has been built with a door on opposite sides—the opening on the east side is used by quarry trucks to dump to the crusher, while on the opposite side a concrete apron extends from the crusher out through the door as a work space to facilitate crusher repairs. An overhead electric hoist, mounted on a rail parallel to the axis of the concrete apron, can be used to dislodge over size stone in the crusher or to move heavy crusher parts for maintenance purposes. All quarry material passes through the primary crusher, with discharge, minus 1½ in., falling to a 30-in. conveyor belt on 112-ft. centers. This conveyor connects with a 42-in. bucket elevator on 71-ft. centers that elevates sized quarry material to the main plant at ground level above the quarry.

Plant Flow

Discharge from the first elevator is to a 4- x 8-ft. triple-deck screen, with 3-, 2-, and 1½-in. mesh on the three decks, respectively. Plus 3-in. stone is chuted to an 8-in. gyratory, set for 1¾ in. Minus 3-, plus 2-in. stone is chuted to a 7-in. gyratory, set for ¾ in. Throughs from the bottom deck, minus 1½-in. material, are chuted to a 38-in. bucket elevator on 90-ft. centers that also receives discharge from the two gyratory crushers. Material from the bucket elevator is discharged to a 4- x 10-ft. triple-deck screen, with a divided bottom deck. Mesh sizes on this screen are: 1½, ¾, ½ and ¼ in. Oversize from the top deck is chuted into one of three bins, each of 75-cu. yd. capacity. The other two bins receive oversize from the middle and bottom decks of the screen, respectively.

Throughs from the 5/16-in. fraction of the bottom deck fall into a 35-ton hopper and are sold to concrete products plants for increasing plasticity of the concrete mix. Throughs from the ¼-in. fraction of the screen are chuted to a single-deck screen, fitted with 8-mesh cloth. Minus 8-mesh material falls into a 45-ton hopper as



One-yard clamshell recovering aggregate from stockpile. Note stacker-belt conveyor top center



Wagon drills, foreground, powered by portable compressor mounted on truck. Plant building, upper right



R. W. Lutz, treasurer, general manager, standing with his wife before the showrooms and general office

AGSTONE



Ed Zentner, left, plant superintendent; and Walt Brown, one of the company's oldest employees.

agricultural limestone, while oversize on this last screen, minus $\frac{3}{8}$ -in., plus 8-mesh stone, is chuted into a 50-cu. yd. hopper for sale as seal coat material.

Material from any of the three 75-cu. yd. hoppers (oversize from the three decks of the second screen) can be directed in any of three directions: to load railroad cars by chute alongside the plant; to load trucks through gates in the bottoms of the bins; or to a 16-in. belt conveyor on 28-ft. centers for delivery to a set of 22- x 40-in. rolls. This last is a recent installation, and has several advantages. If more fine material such as agricultural limestone is required, larger stone is reduced in the rolls, or if the quarry is down for a short time, such as when blasting, larger stone passed to the rolls maintains plant operation. Agricultural limestone produced at this plant has a neutralizing value of from 93 to 99 percent.

Discharge from the rolls, which are set for $\frac{3}{8}$ in., is chuted to the boot of the second bucket elevator for delivery to the second triple-deck screen to complete a closed circuit.

Stacker Belt Installation

Another recent addition to the plant in the interest of smoother operation has been the installation of two stacker-belt conveyors that stockpile plus $\frac{1}{2}$, minus $\frac{3}{8}$ -in. material and plus $\frac{3}{8}$, minus $\frac{1}{4}$ -in. material directly from plant bins. The two stacker conveyors are both 16 in. wide and one is 96 ft. long, the other 85 ft. long. Both belt conveyors discharge at a point 65 ft. above the ground and have an approximate storage capacity of 15,000 cu. yd. each. A 1-cu. yd. crawler-mounted clamshell operates in the stockpile area, loading-out trucks.

Office for the company is located at the entrance to the property, about one-half mile from the quarry. Building housing the offices, sales rooms and equipment warehouse is a handsome brick structure that was formerly used as a barn for thoroughbred horses that the founder, Robert Lutz, bred as

a hobby. The front of the building has been modified with large plate-glass windows in the showroom, as the company has the Pure Oil franchise in the county for oil, gasoline and auto accessories and is also the local Ford tractor sales agency. The area around Oshkosh is a thrifty farming district, and ag-stone, tractors, tires, accessories and oil all interest the same clientele.

Located just outside the window of the general office is a 34-ft. platform truck-scale for weighing out aggregate and agricultural limestone trucks. Controls for the scale are located inside the office, and include a device that automatically compensates for the weight of the empty truck. The scale has a capacity of 120,000 lb. Two 5-cu. yd. delivery trucks are maintained by the company, but 90 percent of all production hauled from the plant by truck is hauled in purchaser's equipment.

The quarry and plant are closed down during severe winter months and the equipment is all overhauled. A new concrete-block building has been erected near the plant as a garage and repair shop. One side of this building features a door of sufficient size so that the largest power shovel can be brought inside for winter maintenance work. All trucks and shovels are cleaned with a cleaning compound and steam every two months, all through the year. According to the general manager, this cleaning of equipment is a definite aid to employee morale. All equipment is painted annually.

Ed Zentner is plant superintendent.

Both the quarry shovel and the stockpile-area clamshell are of Lorain

manufacture. The truck-mounted compressor and wagon drills are of Worthington design Caterpillar 150-hp. diesel engines power both the quarry shovel and the compressor). Delayed action caps used in quarry blasting are produced by E. I. du Pont de Nemours Co. The five trucks used for quarry haulage and delivery work are International 5- and 6-cu. yd. models, respectively. All three gyratory crushers and both triple-deck screens are of Allis-Chalmers manufacture. The roll crusher is of Pioneer design. Electric hoist over the primary crusher is a P & H Zip-Lift. Platform scale for weighing trucks is a Howe Weightograph.

Alabama Graphite Ore

LARGE MEASURED RESERVES of easily handled graphite ore in certain sections of Alabama, sufficient to maintain an industry meeting the demand for specialized graphite products for many years, are reported by the Bureau of Mines in Report of Investigations 4366, "Flake-Graphite and Vanadium Investigation in Clay, Coosa and Chilton Counties, Ala."

Noting that Madagascar flake graphite is preferred to the American product for making crucibles, the report says that the future of the Alabama graphite industry depends upon its ability to supply other outlets. It notes that the foundry trade and makers of dry batteries together require about 60 percent of the graphite used in this country. Other uses cited include heavy machinery lubricant, steam-engine packings, paint for steel structures, coating for prepared roofing, and for increasing the carbon content of steel.

Detailed investigations of the graphite belt placed measured weathered ore reserves at 11,059,000 tons and inferred reserves at 3,351,000 tons. Weathered ore, which has been softened by the action of air and rain water seeping into it, changes in temperature and other factors, is of reddish color, ranges from crumbly to fairly hard, and is nearly always soft enough for the graphite to be separated from the other minerals with a minimum of crushing. Reserves of unweathered ore, dark blue, hard and dense, and thus difficult to mill, were measured at 11,500,000 tons.

Based on preliminary examinations of 49 deposits and detailed study of 11 mine areas, the report concludes that "there is no compelling reason why Alabama graphite producers who can meet strict specifications as to grade, who reduce costs by recovering as many by-products as possible, and who have efficient sales organizations cannot operate at a profit in normal times." Free copies of the report may be obtained from the Bureau Publication Distribution Section, 4800 Forbes Street, Pittsburgh 13, Penn.



Close-up of block and tackle dislodging large stone from primary crusher. Overhead electric hoist is mounted on track for ease of movement

Vertical Lime Kiln Performance

Adverse effects of excessively large, small or poorly graded stone on lime kiln performance

WHEN A GROUP of lime plant operators get together, ideas and experiences are quite freely interchanged, prompting a great deal of thought and study in an attempt to explain or justify differences in operating conditions or results obtained under apparently similar conditions. Typical examples of such controversial points are brought out in the following questions.

Why should it be that kilns of almost exactly the same design may give so much better results in one plant than another? Why should the same size kiln in one plant have an output of probably as much as 80 tons of lime and in another average hardly 40? Why, for the same production per unit of shaft area, should one plant require twice the draft of the other?

And in addition to problems of capacity, why is it that in one plant there should be all sorts of difficulties such as the burning out of fans, slagging of brick work, drawing of hot lime with core and also overburned lime, while in another of virtually the same kiln arrangement there may be hardly any of these problems? In the one plant, operation may be smooth, with high capacity, high fuel economy and a good product is produced with the least of effort and with but infrequent repairs required to the kilns.

There may be a variety of reasons, but the main reason is likely to be stone of improper size, poorly screened and incorrectly charged. Many a well-designed kiln is blamed for poor performance when the cause of it all is the improper size of delivered stone. At times the stone itself is blamed rather than the kiln, but it is seldom that the stone as such is responsible and the reason is far more likely to be that it is improperly prepared.

Actual Plant Examples

This paper will have as its basis a study presented by two plants using stone from the same quarry. We may call these plants Austin and Houston, the Houston plant being that which gives better results and the Austin plant, though obtaining good results, does so with difficulty and the operators are continually confronted with a great variety of problems.

Stone for both plants originates in the same quarry, passes through the

By VICTOR J. AZBE*

same crusher and over the same screening system. In the case of the Austin plant, stone drops into ground storage bins from where it is charged by the shuttling kiln car to the kilns. At the Houston plant the stone from the same screening system is loaded into gondola cars to be shipped to the plant some 175 miles away. There it is unloaded and, between the track hopper and the kiln car, it is rescreened.

Both the Houston and the Austin kilns are of the low type; that is not having the superimposed stone storage zone. The kilns are charged at equally spaced intervals, both day and night. The drop into the kiln is at no time great so breakage on this account is at a minimum.

There is no difference in the stone for the two plants except that the Austin stone, on the way to be charged into the kilns, contains the breakage resulting from the fall of the stone from the screen into the storage bins.

The drop is not far even when the bins are empty, but the stone is soft so it breaks fairly readily. Even then, as judged by the fines removed at the Houston plant, the undersize hardly constitutes more than 5 percent.

But what an immense effect the removal of this small amount of fines has in the comparative operation of the two plants!

Effects of Fines On Kiln Performance

1.) At Houston, for a capacity of one ton of lime per square foot of kiln shaft area, a draft of less than two inches is needed while at Austin, close to five inches is required.

2.) Houston kilns have a potentially much higher capacity, while at Austin the limit is just about one ton per sq. ft. At the Houston Plant a capacity of 50 percent more would readily be possible if the draft was raised to that maintained at Austin. A production of possibly 50 percent more would result through mere removal of about 5 percent of the stone.

3.) The more open void space brings about a better distribution of combustion, leading to more complete combustion of the gas. As the entering gas is assured of its proportionate amount of air, more gas may be ad-

mitted and the kiln operated with a smaller amount of excess air.

4.) Assurance of more complete combustion eliminates the tendency toward high burning, secondary combustion and likely damage to the fans. In some plants there is much difficulty with fire in fans, in others virtually none, all due mainly to channeling caused by the fines.

5.) More uniform combustible distribution and ready access of air to the gas results in more uniform hot zone temperatures, from which a more uniformly burned lime results, with no slaggy overburned material as well as less core. If there is core it comes from overdrawing of the kiln rather than from local relatively cool sections, cool due to either excess or deficiency of gas.

6.) With greater temperature uniformity prevailing not only horizontally but vertically as well, the hot channels leading high up into the charge were far less pronounced; the isotherm lines were horizontal with little deviation. Leading upward, there tended to be a steady drop in temperature.

7.) While the Houston kiln was hot, the heat generally could be controlled and there were no local spots of intense temperature. The general looseness not only permitted the air and the combustible to readily distribute, but it also allowed the recirculating gas to permeate, thus permitting a nice control over the general temperature conditions.

8.) Equalization of the temperature and elimination of hot spots eliminated slagging and running of the brick, thus resulting in longer kiln runs and lower cost of kiln repairs.

9.) More rational existing kiln temperature conditions lead to easier kiln operation and simpler trimming requiring the services of only one man. Through this simplification of the hanging and trimming, it became definitely preferable to the less definite slipping method of operation. Seldom was more than five minutes necessary for this purpose.

10.) The softer burn of the lime results in lower shrinkage of the lumps, thus tending toward retention of the original voids of the stone. This lower shrinkage in turn results in less cracking and spalling and also tends toward retention of the original voids. Finally, in addition to all this, the looser hangs require less poking so less fines

*Consulting Engineer, Azbe Corp., St. Louis, Mo.

LIME

are produced through this operation.

11.) Through all of the above factors combined, the lime in the cooler is mostly lumps with good voids, permitting ready flow and diffusion of air which results in well-cooled lime.

12.) Lower temperature of the drawn lime and recuperative recovery of its sensible heat; more perfect combustion; lower exhaust temperatures and lower radiation loss resulting from higher capacity—all combined, tend toward higher fuel economy. It seems strange and almost unbelievable that all of this should be due to the elimination of the very small percentage of stone represented by the fines. But this quite readily may be so and we herewith give the reasons.

In connection with it all we must remember that effects are cumulative and that one deficiency presents other problems. The original fines will be the cause, in either one or another, of

these ways combined, which follow, in creating more fines.

Lime Characteristics

Lime is a peculiarly behaving substance. Almost always, it is overlooked that, in burning, its tendency is to shrink in size which proportionately reduces the voids. However, in this shrinking it also has a tendency to spall and the fines so created tend to clog the already reduced voids. So, while the preheating section of the kiln may be relatively open and have normal voids, those in the hot zone may reduce to only half size or less and become further seriously obstructed by the shrinkage spalls.

Unfortunately, to have the preheating zone open is of little value if the hot zone is obstructed, since it is in the hot zone that combustion should take place and where the upward flow of the gases and their relative uni-

formity is established. If lime was to present the same voids as the stone, it would weigh only a bit more than half of what the stone weighs. But lime never is so soft burned as to be that light. It often weighs as much as the stone, meaning that it shrunk by half, and at times it is even heavier than the stone. This shrinkage is an effect of temperature and time of calcination; the higher the temperature, the longer the hot zone time and the greater the shrinkage. It is aided by the impurities, their nature and fluxing tendencies, and their distribution through the stone.

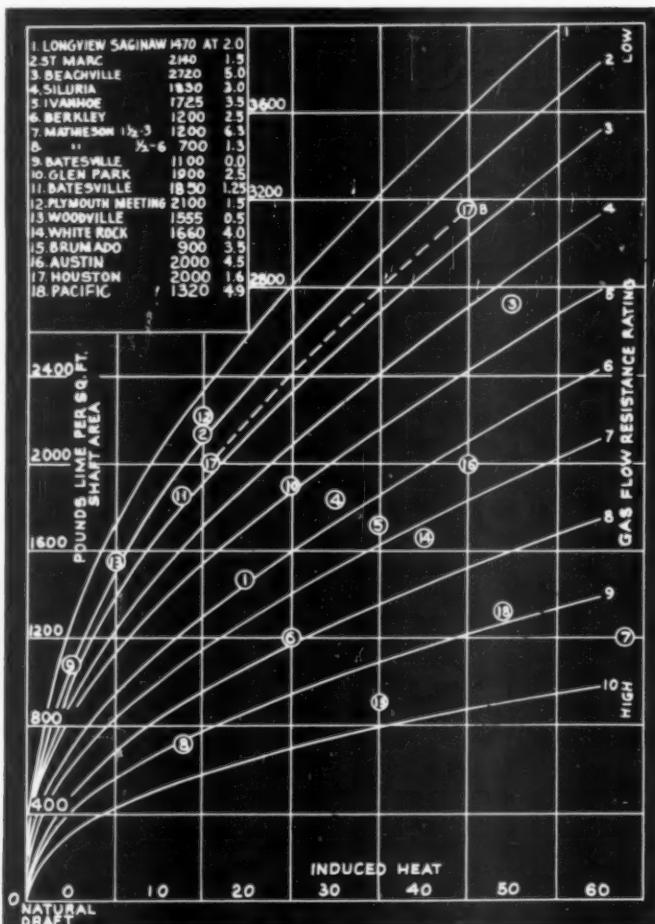
Where a limestone will weigh 160 lb. per cu. ft., the softest lime will weigh only 94 lb., from which it will tend to drift towards 211 lb. per cu. ft., which is the limit for crystallized calcium oxide. It never will be found in the ideal state of 94 nor that of 211, but it readily can become as heavy as 188 lb. when it would occupy just half the volume of the original stone and offer double the resistance to gas flow, even though matters may not be further complicated by the formation of shrinkage spalls. These are formed through the outer portion of the lump of lime being hotter than the inner, thus shrinking more, cracking and breaking. The higher the temperature the greater is this tendency.

Austin-Houston stone has a greater sintering tendency than most stones. That it has a greater tendency at Austin than at Houston is quite interesting. The explanation for this is the difference in the initial screening of the stone at Houston resulting in a freer state of the calcining zone. This allows for improved dissemination of the temperature-controlling recirculating gases tendency; thus toward a lower average temperature as well as a more uniform temperature of the zone.

When there are local hot spots of intense temperature such as may be frequently observed, disintegration becomes extreme, effectively blocking the particular section and causing the gases to flow around, taking the course of least resistance which results in channeling up through the kiln.

Resistance to Gas Flow by Plants

The graphical chart printed here with is most interesting and useful. It presents the draft required by different kilns for the capacity obtained. On the chart are plotted a series of ten curves, each representing a different degree of kiln packing. The curve shapes follow the assumption that capacity varies with the square of the draft; that for double production, four times the draft is necessary. This is generally true, although other influences may change the relation to a degree, but that in no way destroys the great value of this chart's method of presentation of the highly con-



Draft relationship to kiln capacity in vertical lime kilns

LIME

trasting conditions and the prevailing possibilities in many plants.

There are 18 specific examples given of good and poor performing kilns, fed good as well as poor stone. Austin is represented by "16" and Houston by "17." With the sort of stone charged to the Austin kilns, they are just about at the limit of their possible capacity, as draft cannot be raised much more practically and if it is raised, capacity does not tend to increase much as shown in the lower set of curves representing the more densely packed kiln state. In the case of Houston, however, capacity may be increased from 2,000 lb. of lime per sq. ft. of gross area to, as shown by the directing line, 3,200 lb. by just increasing the draft to the Austin point.

Of the plants having the poorer stone, Austin has the distinction of having the highest capacity, all due to the very strong draft combined with the kiln arrangements for recirculation, center burner, and side burners.

Austin stone is soft and its lime has the sintering tendency. If it was not for this and it would be equally well screened, then the Houston capacity-draft relationship would move to the first, most favorable line on the chart. With such stone and such a kiln arrangement, one then could expect to obtain an all-time record of two tons of lime per day per sq. ft. of kiln shaft area or a record production of 100 tons of high calcium lime at 5.5 in. of draft from a relatively small kiln of 50-sq. ft. shaft area. This then we may now consider the possible limit to be attained some day.

In general, while the Austin kilns tend to compare poorly, they actually are not at all so—it is just that the Houston kilns are potentially so much better. The Austin kilns, of Keystone type, 11 feet in diameter, originally produced only ten tons of lime per day, but after conversion to the Aze type, are producing from 45 to 50 tons of much better lime. It would seem that this would be satisfactory, but there is never an end to possible lime kiln improvements. Somehow capacity can always be made higher, fuel efficiency be better, lime improved, operating complications simplified, and cost of operation reduced.

Discussing some of the other kilns of other plants and some reasons for their respective locations on the chart we have:

"4" Siluria: It is located low on the scale because the kilns do not have side burners nor are they arranged for recirculation of gases to aid distribution and temperature control and through the latter, so as to avoid disintegration of lime and consequent blocking of passages.

"7" Mathieson: Location is due to small stone being used in a kiln of excessive height. Kiln height should vary inversely with the stone size; if not, then the result will be either a

very high draft requirement or a low resulting capacity.

"5" Ivanhoe: The reasons for low capacity considering the relatively high draft at this plant were that stone from bins was not screened and that only side burners were used—no center burner. Side burners by themselves do not give a good cross-sectional gas distribution, particularly not with strong draft. It is the center burner that allows the use of very strong draft through more uniform gas distribution.

"14" White Rock: Here stone was too small as well as poorly sized which is a very bad combination. The smaller the stone is, the more necessary good sizing is. Also, small stone kilns must be designed for the purpose, and side burners in combination with a center burner are very much to be desired. Kilns for small stone should also be lower.

"6" Berkley: The lime from this plant has an unusually pronounced tendency towards disintegration and, like some of the "York" stone, it granulates, blocking the passages and so interferes with gas distribution. It is a case where all the possible aids should be brought into play such as good initial sizing, etc.

"8" Mathieson: A hopeless mixture of stone sizes from $\frac{1}{2}$ to 6 in. is fed. That the point location was not even lower is because the kiln was of the mixed feed type, and proper mixed feeding of coke with the stone results in good gas distribution.

"15" Brumado: These are gas-fired vertical kilns sintering magnesite for refractory purposes. Highest temperatures in this case are essential to give a dead-burned product. In addition it is characteristic of magnesite to disintegrate. The point has the worst location on the scale. Nevertheless, considering the product and its characteristics, results are very good in quality of product and capacity obtained, although improvements are possible.

"3" Beachville: This kiln has highest capacity location on the scale but not as high as it could be when judging from Houston experience. Through screening of stone at the bin, reduction of the stone drop into the kiln and improved gas distribution by now well-developed means, higher capacity as well as better burn of lime could be obtained.

High kilns, incorporating stone storage, have certain operating advantages, but with them the disadvantage of breakage of stone through high drops is a factor. It may be best to avoid such high kilns, particularly when the stone tends to be soft. Ground storage with an interposed screen is best with such soft stone, even though stone charging becomes necessary at night.

"18" Pacific: Stone is handled and rehandled, accumulating fines, which hurt excessively due to their localiza-

tion in the kiln. Charging, so as to distribute the fines, combined with improved gas introduction, improved conditions of capacity and quality of lime, would give far better results.

No "Easier-Burning" Stone

The stock excuse of many a lime plant superintendent, when confronted with someone's better results, is that the stone is easier burning. Except that the stone is high in magnesia or in components other than calcium carbonate, there is very little to the excuse. There may be a difference, but it is due to stone size, stone shape tendency, initial screening, sintering and the disintegration tendency as lime, more than anything. Something may be done about all these problems, if they are recognized.

"9" Batesville: Natural draft and "11" induced draft fall into the second order because the stone is of exceptional firmness as stone and also as lime. Lime on the floor still retains the sharp corners it originally had as stone, a characteristic aiding greatly in keeping the kiln open. That more lime is not obtained is only because more draft and gas is not applied.

As to "12" and "13," Plymouth Meeting and Woodville, both produce dolomitic lime, from which high capacity can be far more readily obtained. Magnesium carbonate burns far sooner than calcium carbonate. It seems to the writer that dolomitic and hydraulic lime kiln capacity should be compared on the basis of the calcium portion only.

Why "2," St. Marc, should rate so good, the writer does not fully recollect. However, the stone was hand-broken, hand-loaded and charged into a low kiln which makes a difference, and the kiln had center and side burners, which also makes a difference. There was the opportunity for distribution on one hand, as well as arrangement for distribution on the other which, combined with adequate gas and air, results in the good rating.

Well-Sorted Stone

In demanding well-sorted stone, one has to be practical; and to demand exact uniformity would be unreasonable, costly, and unnecessary. At the Houston plant, an Austin jaw crusher is set for 5 $\frac{1}{2}$ -in. discharge and the vibrating screen over which the stone passes carries 3-in. square mesh. The stone passes over a grizzly with bars spaced for 1 $\frac{1}{2}$ -in. openings in the clear.

The general run of the largest stone has a minimum dimension of about 4-in. and a maximum of about 8-in., with an occasional 9-in. size. The average run of the smallest stone has a minimum dimension of about 2-in. and a maximum of 4 to 5 in. The majority is approximately 3-in. minimum by 6- or 7-in. maximum dimen-

(Continued on page 166)

Merchandising

Glamourize Your AGSTONE!

Other minerals in agstone, including trace elements, are merchandised by Dillon, Sharpe & Co., who use all mediums of advertising from thermometers to thimbles

SELLING a "better" agricultural limestone might be the phrase used to describe the operation of Dillon, Sharpe Co., Columbus Junction, Iowa. Opening a new quarry in 1945, the partners, W. D. Dillon and W. F. Sharpe, were forced to overcome resistance to their product from the first day, due to the fact that the agricultural limestone from their quarry was not the pure white agstone sold in the territory previously. The first step taken by the partners to overcome this opposition on the part of farmers to what they called "dirty" limestone was to have extensive tests conducted

on the stone to prove that it contained ingredients other than CaCO_3 that were equally desirable in a well-rounded soil conservation program.

Advertising Slogans

From these tests, the slogan that appears on almost all their advertising: "A bonus in every load: 50 to 100 lb. natural rock phosphate," was developed. These tests revealed that the analysis of the quarry-run stone

was: 95 percent or more CaCO_3 ; one percent phosphate; and measurable quantities of magnesium, iron, copper, boron, and other trace minerals. With this knowledge, the slogan "Mineral Fortified Lime" was adopted; and now many farmers in the surrounding territory insist on "cream lime" in preference to any other. In the words of Bill Dillon, here is "proof that advertising pays."

The philosophy of merchandising adopted by the two partners can be summed up in the following three points: first, tell the public "who" the company is and where it is located; second, tell farmers what the company sells and why their land needs agricultural limestone; and third, sell the idea that the company's product is a better product and the company's service is a better service.

Mechanics of Merchandising

Dillon, Sharpe Co. is advertised on nine signboards at important intersections in a ten-mile radius. These signs carry the company name, distance and direction from the sign to the quarry, plus a few salient facts or slogans to catch the eye of the farmer. These direction signs are 4 x 8 ft. Also used are 9- x 36-in. signs tacked on fence rows in the territory served and 12- x 36-in. signs that are mounted on spreader trucks, which signs carry the company name and one or more of the advertising slogans. These signs help answer the first point, while the second and third points, concerned with telling the farmers what the company sells, why it is needed on the land and why the company's product is superior, are closely tied together and are accomplished by several different media.

Many classified ads are inserted in all the local newspapers, both daily and weekly; and are augmented by large display ads filling up to one-half page. Again, the same slogans are featured, as for instance in a typical 8-line classified ad: "For the Lands Sake, Use Lime. Insist on Mineral Fortified CREAM LIME. A bonus in every load—50 to 100 lb. of natural rock phosphate," followed by the company name, location and phone number. The display ads are varied with the season, and are used principally in the Fall and Spring.

In connection with the use of news-



In the production of agricultural limestone at the Dillon, Sharpe & Co. quarry, two portable units are used—one a primary jaw and the second carrying the screening and secondary reduction unit. The quarry is directly behind the crushing plant.



W. D. Dillon, left, and W. L. Sharpe point up the fact that their slogan, "For the Lands Sake, Use Lime," is even carried by the company pickup truck.

AGSTONE

paper ad space, all local editors are contacted frequently, which leads to frequent items about the operation appearing in the news columns of the papers, together with photographs. According to Mr. Sharpe, this form of favorable publicity is worth several small ads.

Direct Mail Advertising

Another important medium in addition to newspaper advertising and signs in reaching the prospective customer is the proper use of direct-mail contacts. Of paramount importance in any direct-mail advertising effort, according to the partners, is an up-to-date mailing list. The company uses all the direct-mail pieces available from the Agricultural Limestone Institute, but since they schedule a minimum of six mailings per year, these pieces have to be supplemented with form letters. These letters are sent out usually in the late summer or the first of the year. The late summer letter is built around the theme: "Your fields are dry, spreader trucks can get into your fields and assure you of a good job—now is the time to get your agricultural limestone." The letter sent out shortly after January 1 suggests that farmers include agricultural limestone in their list of practices for the coming year—"It's an easy and sure way of using your conservation credits." Present mailing list of Dillon, Sharpe Co. comprises about 3500 names, including all farmers in the area served as well as all A.A.A. officials and members, county agents, bankers, spreader truck operators and vocational agricultural teachers.

AGRICULTURAL LIMESTONE ORDER CARD

Please deliver about _____ tons of ag. lime to _____

Address _____ Phone _____

Township _____ Approximate delivery date _____

Typical Prices Per Ton Delivered and Spread in Various Louisa Co. Towns,

Columbus City Twp. \$2.82 Grandview Twp. \$3.25 Port Louisa Twp. \$3.39

Concord Twp. \$3.00 Marshall Twp. \$3.25 Union Twp. \$3.00

Elm Grove Twp. \$2.92 Oakland Twp. \$3.25 Wapello Twp. \$3.25

"A BONUS IN EVERY LOAD — 50 TO 100 LBS. OF NATURAL ROCK PHOSPHATE!"

Every ton of our Limestone is of definitely superior quality, testing well over the minimum as established by AAA for calcium content and fineness of grind. This means full earned AAA credit will be paid on every ton.

Scale Ticket Furnished With Every Load For Your Protection

DILLON, SHARPE & CO.
COLUMBUS JUNCTION, IOWA PHONE 28
Quarry 5 Miles Southwest of Town.

Reverse side of a self-addressed, stamped, order card sent out in all direct mail contacts with emphasis on the line: "A bonus in every load—50 to 100 lb. of natural rock phosphate!"

Self-Addressed Order Cards

A self-addressed, stamped order card is included in every piece of direct-mail advertising leaving the company office. These cards are printed in more than one form: a single card for inclusion in a first class envelope or a double card that can be mailed by itself. These cards also carry different sets of rates, depending on the district for which they are intended, allowing for a variance in the cost of transportation to different townships. Mr. Dillon states that the number of these order cards filled out and returned by the farmers is responsible for a substantial part of the year's business.

Both members of the company appear before meetings of 4-H clubs, the Farm Bureau, Beef Association, etc., sometimes merely discussing agricultural limestone and how it will benefit the user, and other times showing an association movie on soil conservation. Three-minute trailers are run in all theatres in the area served as another form of advertising. Company ads are run on covers of rural telephone directories, as the two partners believe it pays to have the company name appear wherever it will be seen by prospective customers, the farmers. They also participate in all county fairs in their territory, with

(Continued on page 152)

AG. LIME

Farmers! Avoid disappointment on your 1946 AG LIME REQUIREMENTS!

Our files are overflowing with orders for delivery after October 15... more than we can ever fill.

NOW IS THE TIME TO LIME BECAUSE

... Your fields are solid and will not cut up!

... Tractors can go every place now while ground is dry!

... Tractors have time to do a first class job of spreading now!

SEND YOUR ORDERS DIRECT TO US OR THRU YOUR COUNTY AAA OFFICE

Full earned AAA credit paid on every ton, because our lime is consistently testing well over 90% in calcium and is ground even finer than required by AAA

Prices Delivered and Spread in Township as follows:

Columbus City	\$2.72	Morning Star	\$1.23
Concord	\$2.82	Oakland	\$1.14
Elm Grove	\$2.72	Port Louisa	\$2.25
Grandview	\$3.06	Hancock	\$2.25
Marshall	\$3.03	Wapello	\$1.25

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Typical order-pulling advertisements which are written to be informative

Pennsylvania Agstone Meeting

FOURTH ANNUAL MEETING of the agricultural Limestone Division, Pennsylvania Stone Producers Association, was held March 3 at the Hotel Penn-Harris in Harrisburg. Chairman F. E. Wholaver called the meeting to order and presented Miles Horst, Secretary of the Pennsylvania Department of Agriculture, who welcomed those present and said that he was glad to report that agricultural limestone producers in the state have been conducting their business on a very high level, meeting all required limitations, as shown by laboratory tests. "During the war we had to relax our requirements because of difficulty in getting material," he said. "As a result, there was a carelessness developed in some plants where they put the guarantee test on the bag, and when we tested the material, it didn't come up to requirements. I am very much interested in the agricultural limestone industry because it is making a very important contribution to our Pennsylvania agriculture as well as to the agriculture of the country as a whole. Figures indicate that last year in Pennsylvania we used somewhere near a million and a quarter tons of agricultural limestone, which is a lot of material for 170,000 farms, many of which are very small. Here in the State we emphasize the importance of liming materials and grass because it is felt that it is very fundamental to our agriculture. Agricultural limestone makes for clovers and grass, and grass makes for the better moisture holding power of the soil, all of which continue to build up American agriculture."

Agricultural Conservation

Roland Crumpler, Production & Marketing Administration, U. S. Department of Agriculture, spoke on the Federal Agricultural Conservation Program. "The Department is again giving quite a lot of consideration to changes in agriculture which may be brought about, and great emphasis is placed on grassland farms," he said. "I think Pennsylvania is well in the front already in getting that sort of a program on a high level of operation. Grassland farming seems to be the answer to soil depletion and the Department is working on that line. In Pennsylvania we have a good start in that direction already."

"Congressional hearings are taking place now on the appropriations for future years. The indications are very favorable, particularly in the field this industry is interested in. It would seem that Congress is going to keep the conservation program going considerably higher than was seen in the past year or two. Already in Washington we are working out the details of 1950 program, and other plans are under way for 1951."

John A. Smith, Production & Marketing Administration, discussed the

industry's present position in the materials field under the Agricultural Conservation Program, stating that "the general policy of this program is pretty much dictated from the national regional level. There were times when this program made liming materials available to the farmer on a basis where he did not have to invest any of his own money in the cost of lime. This resulted in a few isolated cases, in piles of lime, both in bulk and in bags, being stored along the highway without being spread for several years. While the 999 cases where it was spread received no publicity, this one case was held up as an example and was labeled as a monument to the waste in the agricultural conservation program. In order to be sure to eliminate any such repetition, the farmer was made to contribute at first, 10, then 20 and finally 40 percent of the cost of the liming material. That is the condition today, with a result that the monuments, as they were labeled, have completely disappeared. As Mr. Crumpler said, plans are being made further in advance, even for the years 1950 and 1951, so that the agricultural limestone program can function most effectively and most efficiently. In this connection all of our plans in the State P.M.A. office are developed with the aid of our County Committeemen and our field representatives whose experiences over the years have educated them to the point where they can qualify as specialists. With these men, we have developed a long range or 5-year program. These experts are now trained to use equipment and engineering practice so that they can determine whether or not the soil needs lime, superphosphate or contour stripping. These field men will lead us away from the system of getting our advice from the top, that is, at the Washington level. In the future, this information will be developed by our farmer field men in direct contact with the farmer on his farm. In keeping with the above, an experiment is being made in Butler County as well as our neighboring Cumberland County, where the field men are assisting the farmer in making an inventory of his conservation needs. With this as a starting point the farmer will set down on paper his needs for the next 5 years."

Tony DiSanto of the Production and Marketing Administration, added: "Almost all of you probably are wondering at this time what progress we are making in the 1949 program. We've talked about starting the program early every year, but this year we actually got the program underway beginning November of last year, and it looks like our early start is really paying off. Survey on the last day of February on the orders that came in from County State office

amounted to 200,000 tons. That compared favorably with the same date last year. We only had 98,000 tons of orders on February 28 last year. We are 100 percent ahead of schedule. It gives the supplier an opportunity to get started on these deliveries earlier in the year, and at the end of the year we won't have to worry about the second and tertiary sources of supply at the rate set up by the committee."

Population vs. Resources

Following Mr. Disanto, Reuben A. Nagel was presented. "I am a farmer," he said, "and a well equipped farm, one that has been cared for, and a farm that is not plundered and has good management, is one of the world's greatest assets. But when we survey the situation of the world, might it not be well for us to ask this question —'Is it possible that civilization is on its way out?' In only a few years we have plundered and dissipated this planet upon which and under the surface of which the Divine Creator has placed materials for the use and benefits of man. Our scientists have calculated for us when time began, and according to their calculation and our historical records, civilization in the world has existed less than 1 percent of total time. A man who has lived 60 years, comparing it on this basis, has spent more than 59 years and 9 months of that time in a savage state, and but less than 6 months in a civilized state.

"Is civilization on its way out? As a matter of fact, in the year 1650, our total population in the world was estimated to be approximately 400,000,000. What is the estimated population today? Roughly 2 billion. With the present rate of increase, in 70 more years, our total population will reach an estimated 4 billion people. This means double the number of mouths to feed, double the number of homes to keep warm and double the number of bodies to clothe. All these things must be produced from this planet. Farmers in the past in their desire to acquire more and more money, recropped and recropped, paying no attention whatsoever to the preservation of that soil of the virgin farm that took nature 800 years to make one inch of. If we keep on robbing the soil year after year, the land becomes impoverished and the land does not do credit to the operator nor is it an asset to the nation or community. Let me remind you that the very day the soils fail to yield the increase to sustain life, civilization will come to its end. We should all strive to ward off this day."

Frank J. G. Dorsey, Regional Director, Wage and Hour and Public Contracts Division, U. S. Department of Labor, presented a discussion of how the Walsh-Healey public Contracts Act and the Fair Labor Standards Act apply to employees in the limestone industry.

"These laws I assist in administer-

(Continued on page 134)

Diversification



Quarry truck, upper left, dumping stone to primary crusher hopper. Building, right, houses first screens and two secondary crushers while center structure houses secondary screen and truck hopper. Agricultural limestone plant is behind buildings, but is charged by clamshell, right. At extreme right may be seen overhead aggregate bins serving ready-mixed concrete plant

Well Integrated Stone Operation

Agricultural limestone, sand and gravel, crushed stone, and ready-mixed concrete are produced at one location by Courtney & Plummer, Inc., Neenah, Wis. Stationary as well as portable crushing and screening equipment are combined in a widely diversified operation

A HIGHLY FLEXIBLE operation has been built around the recently completed crushing and screening plant of Courtney & Plummer, Inc., near Neenah, Wis. In addition to the quarry operation, a portable mason's sand screening and washing plant has been set up at one edge of the property and receives raw material from a sand deposit 14 miles distant; while sand and gravel is brought to the plant from a pit 11 miles away. The company also operates a portable crushing unit for jobs that are located at such a distance from the plant as to make the crushed stone haul impractical. Other operations include a separate installation for producing

agricultural limestone and another for batching ready-mixed concrete materials to transit-mix trucks.

100-cu. yd. per hr. Plant

Capacity of the main crushing plant is 100 cu. yd. per hr., with approximately 25 percent of the product going to the ready-mixed concrete plant, 10 percent to the agricultural limestone plant and 65 percent being sold as crushed stone for concrete aggregate, black top, seal coat and road stone. A jaw crusher is used as the primary reduction unit, two gyraspheres as secondary crushers and a hammer mill as the final reduction unit for agricultural limestone. An-

nual capacity of this plant is rated at 100,000 cu. yd.

The quarry is operated on 12-ft. levels after an average of 3 ft. of overburden is removed by power shovel. Two 500 c.f.m. diesel-powered compressors deliver air to a maximum of five wagon drills that drive 1½-in. blast holes 12-ft. deep. Stone is loaded to three 5-cu. yd. end-dump trucks by a 1½-cu. yd. power shovel for the ½ mile haul to the crushing plant. At the plant, quarry-run material is dumped to a surge hopper over a heavy-duty feeder, which delivers an even flow of stone to a 24- x 36-in. jaw crusher, set for 3½ in. and powered by a 100 hp. motor.

Screening

Primary crusher discharge is elevated to the first screen by a 30-in. belt conveyor on 135-ft. centers. There are two principal screens in this plant, both triple-deck and measuring 4 x 12 ft. One screen precedes and the other follows the secondary crushers in the plant flow. Mesh size on the bottom deck of the first screen is ¼ x ¾ in. and on the second screen 3/32 x ¼ in. Management of the plant states that this form of rectangular opening removes chips (slivers or elongated pieces) from the flow, preventing their being classified with the larger material.

Oversize on the top deck of the first screen, plus 1½-in. stone, is chuted to a 12-cu. yd. surge hopper which feeds a 36-in. gyraspHERE secondary crusher, set for 1½ in. and powered by a 100-hp. motor. This crusher dis-



End-dump, 5-cu. yd. truck being loaded by 1½-cu. yd. power shovel

AGSTONE



Front-end loader used for reclaiming stockpiled material or cleaning up around yard

charges to a 24-in. belt conveyor on 100-ft. centers for elevation to an 8-cu. yd. surge hopper for transfer to the first conveyor, which discharges over the first screen in a closed circuit. Oversize on the second deck falls into one compartment of a 4-compartment bin of 200-ton total capacity. Oversize on the bottom deck falls into another compartment and throughs from the bottom deck are chuted into the two remaining compartments.

Overflow from the first two bins (containing the coarser material) is chuted to stockpiles immediately alongside the bin structure, or stone in these bins may be sent to a 24-in. gyrasphere, set at $\frac{1}{8}$ in. and powered by 50-hp. motor. Discharge from this crusher or material from either of the two bins holding throughs from the bottom deck of the screen are collected on an 18-in. belt conveyor on 100-ft. centers which discharges over the second triple-deck screen. Top deck of the second screen is identical to the bottom deck of the first screen: $\frac{1}{4}$ - x $\frac{3}{8}$ -in. elongated mesh opening. Oversize on this deck is chuted to the 8-cu. yd. transfer hopper serving the first belt conveyor. Oversize from the second deck, fitted with $\frac{1}{8}$ -in. mesh screen cloth, is piped to a stockpile alongside the truck hopper, above which the screen is mounted. Oversize and throughs on the bottom deck of the screen fall into individual compartments of the truck hopper, with a total capacity of 80 tons.

Agstone Operation

The agricultural limestone processing plant consists essentially of two overhead hoppers with the hammer mill located under the first, and the second a truck hopper for loading spreader trucks, receiving finished stone from the mill. A crawler-mounted crane with a 45-ft. boom and 1 $\frac{1}{4}$ -cu. yd. clamshell transfers material from the stockpile (formed by overflow from one compartment of the four-compartment bin ahead of the secondary crushers) to the overhead hopper above the hammer mill. Stone is fed from the hopper to an 18- x 32-in. pulverator, set for 3/16-in. opening, by a pan feeder powered by a belt from the mill. Discharge from the pulverator is transferred to a 30-cu. yd. truck hopper by a bucket elevator.

Ready-mixed concrete materials are

batched from overhead bins served by a 24-in. belt conveyor on 115-ft. centers. A total of seven transit-mix trucks are operated, three of 5-cu. yd. capacity, three of 3-cu. yd. capacity and one of 3 $\frac{1}{2}$ -cu. yd. capacity.

Maintenance

All material deliveries are made by truck, both to and from the plant, and in such a widely diversified operation as this, much mechanical equipment is required. As a result, a large garage, measuring 48 x 150 ft., and a wing measuring 48 x 70 ft., have been built and equipped. In addition to normal operational maintenance, all crushers are placed in the garage for complete overhaul every winter.

Equipment List

Diesel quarry shovel as is the clamshell in the stock yard. The clamshell is powered by a Chrysler gasoline industrial engine and works a Blaw-Knox lightweight bucket. The two truck-mounted compressors are LeRoi, powered by Caterpillar D-1300 engines, while three of the wagon drills are of Chicago-Pneumatic manufacture and two are Sullivan. Quarry trucks are International K-11. The plant equipment including the feeder and primary crusher, both secondary crushers and both 3-deck screens were manufactured by Smith Engineering Co. The jaw crusher is powered by a 100 hp. Westinghouse motor and the two screens by 10 hp. Louis-Allis fully enclosed motors. A 100-hp. International diesel engine powers the Lippman pulverizer in the agricultural limestone plant. The portable sand and gravel plant operated by the company is of Lippman manufacture. Three main conveyors in the plant, all of company design, operate on Link-Belt and Atlas idlers; two carry Republic Rubber Co. belting and one carries Goodyear belting. They are all pow-

ered by U. S. Syncogear motors. The ready-mixed concrete delivery equipment includes: Rex 5-cu. yd. mixers mounted on International K-8 and K-11 trucks; and Smith mixers mounted on Oshkosh and GMC trucks. The 3 $\frac{1}{2}$ -cu. yd. mixer is a Rex, mounted on a GMC Army 6 by 6.

The company was incorporated in 1946, but was a partnership from its founding in 1928 until that time. Earl Plummer is president, David Courtney, vice-president, and Walter Courtney, secretary-treasurer, of the firm.

Merchandise Liming Materials Over Radio

A GROUP of Missouri agricultural limestone producers are sponsoring radio programs on a regular basis in the merchandising of their product. The programs include one-minute spot announcements of about 100 words, three to five times weekly, and a fifteen minute "farmer's hour" each week during which time general farm news is narrated.

Members cooperating are: George Baker, Lockwood; Carthage Marble Corp., Carthage; Chillicothe Stone Co., Mooresville; Clark and Runquist, Savannah; Everett and Clark, Plattsburg; Farmers Rock and Lime Co., Mooresville; Gordon Brothers, Forest City; M. M. Green, Carrollton; Merlin Hamill, Canton; L. W. Hayes Quarries, Bethany and St. Joseph; Independent Gravel Co., Joplin; Fred McVey, Chillicothe; Producers Materials Co., Berlin; Snyder Quarries, Gallatin; Southwest Lime Co., Neosho; and Donald Wilcox, Trenton.

Purchase Gravel Plant

BLUE RIVER SAND AND GRAVEL CO., Blue Rapids, Kan., has been purchased by the Stryker families with Alva Stryker, Mrs. Stryker, and three sons, Russell, Fred and Floyd, as directors.



Portable compressor, foreground, with two wagon drills. Note quarry truck on way to plant, background

Manufacturing Refractory Dolomite

Prospecting and requirements in dolomitic deposits; crushing, grinding, sizing, storage, kiln feeding, screening and manufacturing costs considered, together with possible new uses for refractory dolomite

THE MANUFACTURE of refractory dolomite, or dead-burned dolomite as it is frequently termed, has become a sizable industry since the turn of the century. No doubt the history of this activity would make extremely interesting reading. The earlier products were made in "roasters" similar in many respects to the old type shaft lime kilns in which the charge consisted of alternate layers of dolomite and coke. Probably the latest innovation to the industry has been the application of the rotary kiln, in place of the roasters, to the process. With the exception of a few members of the industry, probably no other industrial activity of our age suffers more from the lack of competent technical guidance than the dead-burned dolomite industry.

Up to the present time, the processing has been cloaked in the greatest possible secrecy. Actually there is very little to be secretive about. Provided with a suitable source of dolomite, any cement, lime, or other material-producing plant using rotary kilns can produce dead-burned or refractory dolomite with but a few simple modifications. A good practical operating crew can acquire the "know-how" in a surprisingly short time. The exchange of operating data between the members of the refractory dolomite industry is extremely meagre, and that which is transmitted is usually mis-information. To secure entrance to a dead-burned dolomite plant to observe the process is, in most instances, beyond the realm of the possible. A dolomite manufacturers' association knits the members into a close business operating group.

The cost of producing refractory dolomite is closely guarded. It might be said, however, that in a properly designed plant, the manufacturing cost will not exceed \$2.50 to \$3.50 per ton. More will be said about this, however, toward the end of this article.

The use of refractory dolomite as a material for patching open-hearth steel furnaces has occasioned the steady growth of the industry. As steel-making capacity has increased, so has the capacity of the refractory dolomite industry expanded. Gener-

ally, the dead-burned dolomite is used only as a patching material for the bottoms and banks of basic open-hearth steel furnaces. The original hearths are built up of dead-burned magnesite, since this material is more stable than dead-burned dolomite under atmospheric conditions. With the violent action prevailing in the operating furnace, however, even the refractory magnesite gives way, resulting in holes in the original bottoms and banks. Refractory dolomite provides a relatively inexpensive yet effective patching material for these eroded spots.

Some thought has been given to dead-burned dolomite in building up the hearths of these steel furnaces. Also, some experiments have been conducted in building up the hearths of electric furnaces with this material which appear promising. These furnaces are small, however, and failure would involve only a corresponding loss. It is not beyond the realm of possibility for refractory dolomite to be stabilized so that it may be used satisfactorily to make up the entire hearths of basic open hearth steel furnaces.

The dead-burned dolomite is supplied to the steel mills in the form of granules. The size, or the size distribution, is generally specified by the steel mills. Some steel mill operators prefer the size to be minus 1/16 in., while others want minus 1/8 or 1/4 plus 1/32 in.

Dolomite

Dolomite is a natural mineral of rather common occurrence. On the North American continent it is found from Alabama to British Columbia, and from Texas to Ontario. Some of the deposits are restricted to small local pockets, while others are massive deposits of great depth and extent. Frequently the deposits are of high purity. Others are so contaminated that they are worthless as sources of raw material for refractory purposes.

Pure dolomite is composed of molecular proportions of calcium and magnesium carbonates, so that by

analysis it is 45.5 percent magnesium carbonate and 54.5 percent calcium carbonate. Impurities consist largely of silica, iron and aluminum oxides, titanias, sulphides of iron and zinc (pyrites and sphalerite), and occasionally lead carbonate. In many instances the impurities replace the desired magnesium so that the dead-burned material, unfortunately, suffers from this deficiency.

Upon calcination of the dolomite, practically all of the carbon dioxide is eliminated when dead-burned, so that the residue will contain one mol of magnesia per mol of lime. With pure dolomite there will remain about 40.8 percent of magnesia and 59.2 percent of lime. Dead-burned dolomites of commerce may have a magnesia content as low as 30 percent.

Naturally occurring silica should not exceed 1½ percent in the dolomite when it is to be dead-burned for refractory purposes. Although some optimum quantity of impurity is desirable to promote proper shrinking, which will be discussed later, it is desirable to add these as required rather than have them exist uncontrolled in the raw material.

Prospecting

Federal and State Geological surveys usually show the locations of dolomitic deposits where such surveys have been made. In areas where these surveys are lacking (and there are a surprising number of areas in the United States which have been thoroughly surveyed), the best recourse is to sample promising outcrops, or study the nature of the topsoils. Unfortunately, as in the case of searches for good limestone deposits, the purer deposit weathers the easiest and quickest, so that these are generally well covered with a heavy residue of topsoil. The exceptions to this rule are the extensive horizontal beds, similar to those found in the central states, where distortion and deformation hasn't progressed to any appreciable degree.

In any event, the extent of the deposit must be investigated to a satisfactory degree. A plant to manufacture refractory dolomite represents too large an investment to risk work-

*Consulting Chemical Engineer.

DOLOMITE

ing a deposit that may eventually prove to be too small.

Core-drilling is by far the best means for determining the features of the deposit. The core specimens show not only the texture of the dolomite, which is extremely important, but also any seams of impurities and crevices. Samples for chemical examination can be taken at any point or points.

It is well to keep the cores in boxes especially made for them. These boxes can be rough board containers about 12 ft. long and 30 in. wide and 3 in. deep inside, divided by wooden partitions lengthwise into 3-in. compartments. Thus, one box will hold from 100 to 120 ft. of 2 in. core. It is good practice to hold these cores in identified boxes before disposing of them until all the prospecting work is completed.

An excellent system of core drilling is to space the test holes initially every 300 ft., and bore to a depth that will provide a good working face for an open quarry operation. Thus a depth of 100 ft. will prove adequate for the first series of test holes. If irregularities in the deposit are indicated, the spacing of the holes can be made smaller and the depth altered to suit.

A good practice to save time and expense in the drilling and in the chemical examination is to sample every 6 in. of the core, and make a composite sample of the chips. If the analysis of the composite is satisfactory, that is the only analysis required for that core specimen. If the analysis of the composite is too high in one or all of the impurities, the core can be resampled and the location of the place or places where the impurities occur can be determined.

In prospecting a deposit, it is well to determine the approximate number of years it will provide the desired quantity of raw material.

Quarrying

Open quarrying is by far the most economical means of working deposits of this nature for this purpose. Tunnel mining is too costly.

Quarrying operations have changed considerably in the last ten years. The older methods of transporting the stone from the working face consisted of cars, that were filled by hand, and drawn by mules or engines, to the foot of the incline. Some operations had self-propelled electric cars controlled from a tower. At the foot of the incline a cable would be attached and the car hoisted up the incline and out of the quarry and delivered to the primary crusher. In the modern quarry operation the primary crusher is located on the quarry floor. Power shovels load into trucks at the working face, and thus the stone is delivered to the primary crusher. From the primary crusher, the rock is elevated to the secondary crusher and

screening plant by means of an inclined conveyor. Thus an operating crew of five men can handle sufficient stone in the quarry to keep a dead-burned dolomite plant, capable of producing 500 t.p.d., in operation.

Crushing and Grinding

The primary crusher generally is of the gyratory type, although jaw crushers can be used satisfactorily on certain varieties of stone. The gyratory crusher will produce a more cubical product, especially when the deposit exists in thin layers. The product of the primary crusher will have a size such that it will pass through a 3-in. or 4-in. square screen.

Each time the stone is put through a crusher, a quantity of undesirable "fines" will be produced. Consequently it is best to remove the desired size of stone after each crushing operation, and to determine the optimum setting of the crushers so as to produce a minimum of fines and yet produce the desired tonnage. Various arrangements have been worked out to take

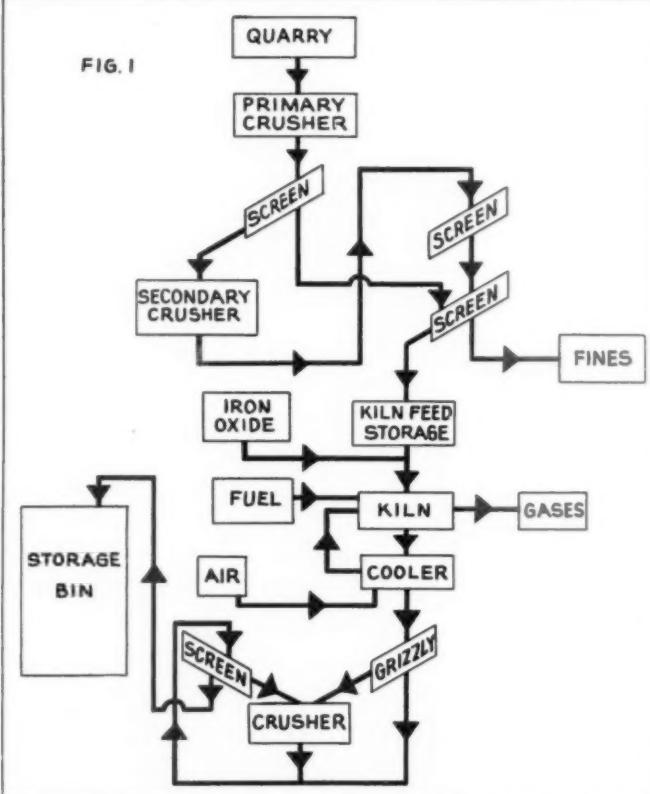
care of this. An effective but simple arrangement is shown in Fig. 1.

Thus the product of the primary crusher is delivered onto a screen which removes the size wanted. The overflow passes to the secondary crushers or grinders and their product is passed over screens to take out the size wanted. The oversize of these screens is returned to the grinders with the overflow from the primary crusher screened material.

Sizing the Stone for Processing

The particle sizing of the raw dolomite determines the size, generally, of the finished product, or dead-burned dolomite. The raw stone, during the dead-burning process, loses from 45 to 47 percent of its original weight. The dead-burned dolomite, however, has almost the same specific weight as the stone. Thus a cubic foot of the raw material aggregate will weigh nearly 100 lb., and a cubic foot of the dead-burned dolomite also has the same weight. This phenomenon is occasioned by the shrinkage of the particles during the processing or

FIG. 1



A recommended typical flowsheet for production of dead-burned dolomite

DOLOMITE

dead-burning in the rotary kilns. To produce dead-burned dolomite particles with a top size of $\frac{3}{8}$ -in. square mesh screen, the top size of the particle fed to the kiln will be $\frac{1}{2}$ in. to $\frac{3}{8}$ in., depending upon the nature of the raw material.

Since the "fines" in the raw feed may cause considerable operating difficulties with the kiln, these are eliminated by screening, or only small, well regulated portion is allowed to pass on with the kiln feed. If the fines are allowed to remain in the feed, there is danger of building up heavy accretions of "coating" in the kiln which may eventually choke the kiln off. Without some fines in the feed, there is grave danger of shortening the life of the refractory lining of the kiln because of the lack of coating. In some operations, about 10 percent of fines in the feed will be the right quantity. Any size less than $1\frac{1}{32}$ in. x 3-4 in. Ton-cap screen is considered as fines.

These fines had been a troublesome waste material; but, today they bear their portion of the manufacturing expense. They are finding a ready market in the manufacture of chemical fertilizers where they are used as a filler, or they may be applied directly to the soil as a "sweetener."

Storage of the Kiln Feed

The stone feed, now properly sized and the fines removed to an acceptable degree, is delivered to storage bins. These bins are usually constructed of steel. In the more modern plants, these bins are covered, but extend above the buildings, and have a capacity of 500 to 1000 tons. They are weatherproofed, since in cold weather, in the more extreme latitudes, the wet stone would freeze and great difficulty would be experienced in getting the material to flow out of the storage bins. This is especially true when the stone has been washed, although there is little justification for washing when the quarry, especially the operating face, is kept clean of overburden. The lower portion of the bins may be included in a closed structure that can be heated during the cold months of the year. This will prevent freezing, and enable the stone feed to be withdrawn from the storage bin at the constant rate necessary for good kiln operation.

Feeding the Kiln

The well arranged plant will have the storage bins in line so that the stone can be withdrawn onto a belt conveyor from any one of them for delivery to the kiln feed elevator. This is shown in Fig. 2. And since the rate at which the material is fed to the kiln should be constant at all times for a specific speed of the kiln, the driving mechanism for the belt conveyor must be synchronized with the speed of the kiln. The amount of material fed to the kiln thus depends

upon the speed of the conveyor belt, and the quantity of material on the belt. In this way the amount of material in the kiln can be kept constant at all times.

Certain of the dolomites are so pure they would require excessive temperatures and time to shrink them properly during the dead-burning process. It seems that a small amount of impurity facilitates this shrinkage of the particles. This is typical of the dolomite found in the extensive Ohio deposits. In these cases some impurity is added, usually in the form of iron oxide. The iron oxide may be in the form of ore, mill scale, blast furnace flue-dust, etc. Generally this is most conveniently and effectively added onto the conveyor carrying the raw stone just before it discharges into the boot of the kiln feed elevator. The feeding of the iron oxide, too, must be synchronized with the speed of the kiln and the stone feed conveyor.

Experience alone will show the minimum of impurity that must be added to the stone to promote shrinking. With the Ohio dolomite a minimum of 3 percent iron oxide in the dead-burned product will serve. With the Pennsylvania dolomites of the Ledger and Vintage types, sufficient impurities are present to make additions unnecessary.

The greater the amount of iron oxide (or silica) that is present, the easier the shrinkage is during dead-burning. Thus the productive capacity of the plant can be increased. On the other hand, the impurities greatly reduce the refractory properties of the product to the point of inutility if they are present to an amount greater than 10 percent.

Burning the Dolomite

The rotary kiln has been found to be the most adaptable type of furnace for carrying on this process. It is capable of handling large quantities of material at a cost less than any other type of furnace. Cheap fuel can be used, and a minimum of manpower is required.

The kiln feed elevator delivers the raw feed to the feed end of the kiln. Here it comes in contact with the hot gases and the hot walls of the kiln. It also receives heat radiantly from these two sources. In traveling through the kiln, the feed approaches the hot zone at the discharge end during which it is calcined and finally, in the hottest zone of the kiln, undergoes incipient fusion when the particles shrink with the absorption and combination of the impurities.

When the impurities are in excess of 6 percent, the temperature in the hot zone will be in the neighborhood of 3000 deg. F. to develop a suitable product. When the impurities are less than 3 percent, temperatures higher than 3500 deg. F. are required to shrink the material properly.

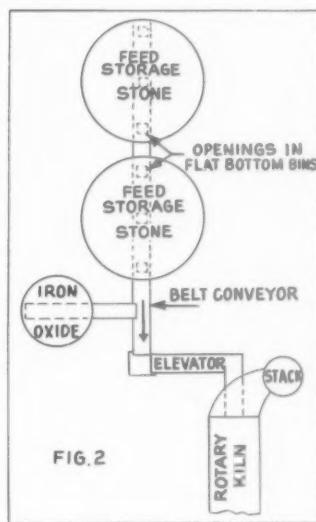


FIG. 2

Recommended layout of bins

From the kiln the dead-burned dolomite passes to the cooler where some of its heat is recovered by preheating air for combustion.

As it is delivered from the cooler, the properly dead-burned dolomite has a dull brown to black color, and is of a specific weight equal to or even greater than that of the original stone feed. With a relatively high iron content, it will have a specific weight greater than the raw feed aggregate. When properly burned, the corners of the particles are sharp and not too rounded. It is extremely hard; some varieties will scratch glass. Upon breaking open a particle, the freshly fractured surface has the appearance of beeswax. With the complete combination of the iron oxide, the particle may be black throughout its bulk. With only partial absorption, the color graduation is from black at the surface to light tan in the center. When the material is underburned, many of the particles will pop open on cooling.

Screening

As it is delivered from the cooler, the majority of the dead-burned dolomite will be of the desired size corresponding to the size of the aggregate fed to the kiln. There also will be pieces of "coating" that have dropped from the walls of the kiln as well as agglomerations of particles that have fused together in the hot zone of the kiln. There also will be some "fines" resulting from abrasion and spalling of the particles. Consequently a certain amount of processing must be performed on the material at this

(Continued on page 161)

GERMAN DOLOMITE PLANT

Semi-burned dolomite processed for special purposes and tar-bonded dolomitic material processed for lining rotary kilns in German plant

By HANS RUSCHE*

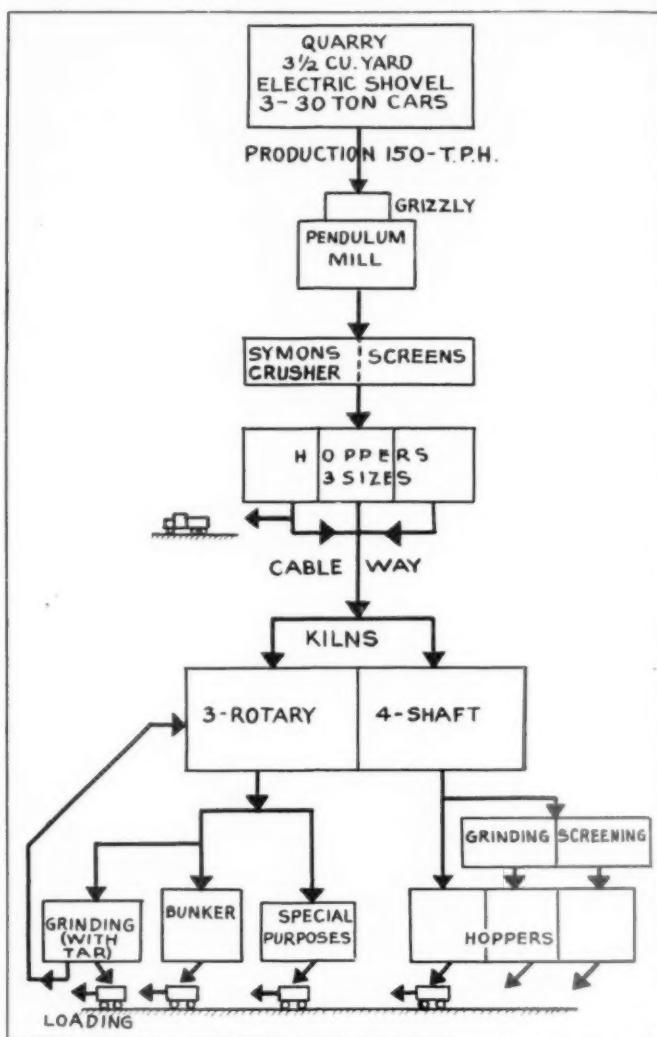
ORIGINALLY this German plant was erected exclusively to supply the steel industries with sintered dolomite. The dolomite contains 58 percent CaO and 35 percent MgO. The stone has a brown color, a dense structure, and is very hard. Material passing 1-in. mesh is hard burned in three rotary kilns, while the stone from 2- to 6-in. is sintered not quite so hard in four high capacity shaft kilns. The intermediate product, 1- to 2-in., is crushed down for the rotary kiln.

Loading Installation

The loading installation in the quarry, which is connected with the kilns by a cableway one mile long, was constructed to supply the needs of the kilns. Stone from the quarry is loaded with a 3½-cu. yd. shovel into 30-ton cars, which are dumped at the plant with the stone passing over a grizzly to the pendulum mill where it is broken down to 6-in. size. The material is sized over screens with 1-, 2-, and 6-in. mesh, the intermediate size being reduced in a Symons mill to 1 in. It is sometimes necessary to remove material below 7 in. if it contains too much earth, depending upon the weather and quarry deposit being worked so as to prevent excess ring formation in the rotary kilns.

Rotary kilns have a diameter of 10 ft., two of the kilns being 230 ft. long, and one is 328 ft. long. For a refractory in the sintering zone, in which a temperature of 3100 deg. F. is reached, a magnesite stone is used for part of the length and a tar-bonded dolomitic material is used in the feed end. The yield of the kiln averages 150 tons per day, although peak loads may reach 200 tons per day. One kiln is usually out of operation for repair. The sintered material cooled in a rotary cooler is weighed and transported to the loading hoppers. The fuel requirement of the kiln is met by a comparatively low B.t.u. coal, ground in a Raymond mill and an air-cooled tube mill.

The four automatic, high-yield shaft kilns are supplied with rotary grates and feeders, such as are common in the German cement industry. Operation is continuous under an air pressure of 43 in. of water. About 28 percent coke is mixed with the dolomitic stone by means of a cableway above the



Diagrammatic flow sheet of modern German dolomite plant

kilns leading from the feed hoppers. From these hoppers the feeding of the kilns follows in regular and comparatively short intervals.

Rotary as well as shaft kilns are connected to a dust collecting cyclone so that the coarse dust is precipitated and used. The rotary kilns operate

with natural stack draft and the four shaft kilns are exhausted to one common 113 ft. high stack.

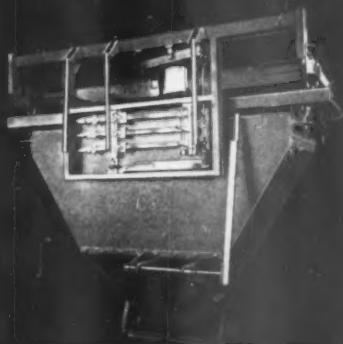
The shaft kiln sintered product can be used either in whole pieces or finely ground. The yield of each shaft is over 125 tons per day.

(Continued on page 169)

* Consulting engineer, Wulfrath, Germany.

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ERIE presents a complete line of aggregate handling equipment and storage tanks. From the mobile C-Portable Aggrometer to the largest of fixed plants that combine Aggregate and Bulk Cement handling. Erie is prepared to meet your needs. May we direct you to some Erie Aggrometer installation near you, or let's have your immediate problem for recommendations. We list standard plants, left below. Write for bulletins.

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Portable Plants
36, 52, and 68 cu. yard sizes

TYPE CAB

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TYPE CTE

Like Type CAB
Only with Long Columns

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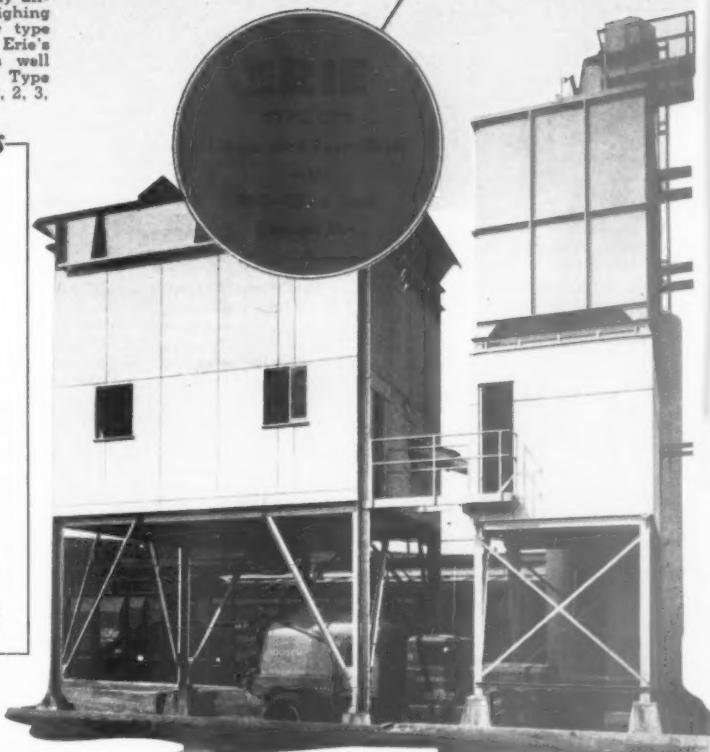
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TYPE L

Single and Double Compartment
90, 112, and 148 cu. yard capacity

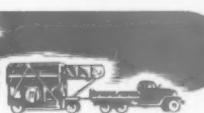


ERIE

STEEL CONSTRUCTION COMPANY

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Pennsylvania Agstone

(Continued from page 126)

ing are humanitarian, it is true, but they are also grounded in economic realities," he stated. "They are a form of insurance for decent business men against those occasional employers who would cut their production costs by paying 'cheap' wages. And as to employees, when they are paid enough to maintain themselves decently and when they work a reasonable number of hours, they contribute to productive processes with maximum efficiency.

"Of course I don't mean to imply that we should look on working men and women as part of the productive process only. Their wages buy the products of American industry and of our farms, to the extent that should their power to demand goods and services fall off, so must our business and agricultural activity of necessity decline. I'll speak about the Walsh-Healey Act first, but before getting down to cases, I want to indicate more concretely how this Act has benefited employers. The Government, through this law, asserted that its power to make contracts included the right to require minimum labor standards of its contractors.

Walsh-Healey Act

"In passing this Act, back in 1936, two years before the Fair Labor Standards Act was enacted, the Congress not only undertook to lead the way to better economic conditions through improved standards for labor, but sought to eliminate a real danger to the competitive system, a danger which arose from the fact that the decent manufacturer was subject to economic handicaps in obtaining governmental contracts.

"Under the laws at that time, Government contracts had to be awarded to the lowest bidder, the only qualifications being financial responsibility. Usually the 'lowest bidder' meant the bidder having the lowest wages and longest hours. The conscientious employer was constantly confronted with economic pressure to preserve himself by cutting wage scales in order to meet unfair competition. The enactment of the Public Contracts Act helped remove this burden from decent manufacturers and prevented the Government from being a contributing factor to the exploitation of its citizens.

"The Act's provisions for overtime of time and one-half the regular rate after 8 hr. a day, or 40 hr. a week, according to which ever method of computation would yield the employee more pay, set an example of what Congress considered a fair day and a fair week as to hours of labor. And, too, the Act made provision for the issuing of minimum wage determinations, though, as you know, none apply to the limestone industry. Your interest, therefore, is in the applicability of the overtime provisions, and I shall use as my frame of reference

for this problem the various situations concerning hauling and spreading lime which should interest you most.

"First of all I want to make it clear that the Walsh-Healey Act does not apply to all contracts with the Government. It applies only to manufacture and supply contracts in excess of \$10,000. You need not be concerned as to whether or not your employees cross State lines in performing these contracts, or whether you ship out of your State. It is merely a question of the amount of the contract. Individual contracts under \$10,000 are not subject to the Act.

"I understand that some of you have contracts for indefinite amounts. Just a few words about this matter. If the Government agency with which you have a contract has reason to know that the sum total of the call letters made against your contract may exceed \$10,000, it will include the Walsh-Healey stipulations in your contract. On the other hand, if the contracting Government agency knows that the amount purchased against the contract will not exceed \$10,000, the contract will not include the stipulations. And if the gross amount is indefinite, but has a top limit of \$10,000, the contract will not include the stipulations.

"Now let's assume that you have a contract that includes these stipulations and that your contract requires you to undertake the spreading and hauling of lime. Let's make another assumption that you, a limestone producer, have your own trucks and deliver and spread your own lime. In this situation, your employees who deliver and spread lime will be subject to the Act's provisions.

"But what if your contract calls for hauling and spreading lime, and you don't have your own trucks and truck drivers? Say you hire a farmer to do this work, and this farmer may haul your lime to his own farm or the farms of his neighbors or anyone else you tell him to take it to, and spreads it as required. In such a case, the farmer will be deemed to be an employee of you, the contractor.

"Next, what happens if you, as a limestone producer, engage an owner-operator of a truck to undertake the hauling and spreading of lime for your own company exclusively? Under these circumstances, that owner-operator will be regarded as your employee and will accordingly be subject to the Walsh-Healey Act.

"However, it may be that this owner-operator is not hired by you to haul and spread, i.e., he may himself have a contract with some Government agency to haul and spread your lime. You won't be responsible for the wages he pays his employees, or for his own compensation, in fact, his operations are exempt under the Walsh-Healey Act, since the Act doesn't apply to contracts exclusively for hauling.

"And now, take the case where the contractor who produces the lime ar-

ranges with a trucking company for the delivery or spreading of limestone. Coverage of the haulers would depend on the regular practice in the limestone industry, since it is the regular practice which determines whether an employer is a 'substitute manufacturer,' as that term is used in the Walsh-Healey Act Regulations, and consequently subject to the Act; or whether he is a subcontractor, in which case his employees are not subject to the Act.

"And for the final situation under the Walsh-Healey Act, let's consider the case of the producer who has a contract which calls for the supply of limestone at a distributing point to which farmers come to obtain limestone. Under this circumstance, the contractor's responsibility ceases when lime is at the distributing point. The hauling and spreading of the limestone by a farmer from this distribution point to his farm, or to the farms of others, is not subject to the Walsh-Healey Act.

Wage and Hour Law

"I think you will also be interested in how the Fair Labor Standards Act—the Wage and Hour Law—applies in situations similar to the ones I have discussed. Most of you know, doubtlessly, that this law, like the Walsh-Healey Act, contains provisions on minimum wages and overtime pay. But Wage and Hour Law coverage is quite different from that of the other Act.

"The Wage and Hour Law's minimum wage and overtime provisions apply to employees engaged in interstate commerce or in the production of goods for interstate commerce, including occupations necessary to such production. These covered employees are entitled to a minimum wage of not less than 40¢ an hour and overtime of at least time and one-half their regular rate of pay for all hours in excess of 40 in the workweek. However, the law itself specifically provides some exemptions from these minimum wage and overtime provisions.

"Now back again to your hauling and spreading operations. Coverage under the Wage and Hour Law would be asserted where the hauling and spreading are necessary to the production of goods for interstate commerce. And these operations are necessary to the fruits, vegetables, and other farm products—produced by the farmer who utilizes the lime, moved in interstate commerce.

"But the fact that coverage may exist doesn't mean that all your employees must be paid according to the minimum wage and overtime provisions. You'll recall that I said the Act provides some exemptions, and the one I think you'll be specially interested in is the minimum wage and overtime exemption for employees who are employed in 'agriculture.' As defined in the Wage and Hour Law,

(Continued on page 168)



NEW TUBE-TYPE TOTALLY-ENCLOSED FAN-COOLED Motors

Maintenance cut sharply on
outdoor, corrosive and dirty
installations 150 H. P. and up

THE UNIQUE COOLING SYSTEM of the new Allis-Chalmers tube-type, totally-enclosed, fan-cooled motor reduces maintenance to a point never before reached in totally-enclosed motor design. Tubes surround the stator. Internal fans circulate air within the motor to transfer heat to the tubes. An external fan moves outside air through the tubes to remove heat quickly and effectively.

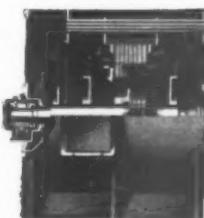
Maintenance Materially Reduced

The new Allis-Chalmers tube-type motor rarely needs cleaning because tubes are straight, the air passages unrestricted, and the cooling air flows at sufficient speed to carry foreign matter out with it. Should unusually dirty air conditions make cleaning desirable, tubes can be swabbed out quickly and easily. This new motor can be installed indoors or out in any atmosphere.

Cooling Efficiency Proved

Three years of successful field operation back up this new motor. For information, on how it can mean lower costs for you, contact your nearest A-C District Office or write for bulletins 51R7149 and 05B7150.

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HOW TUBE-TYPE COOLING SYSTEM SAVES YOU MONEY ON MAINTENANCE

1. **LARGE HEAT TRANSFER AREA** of tubes plus efficient air flow removes heat quickly.
2. **STRAIGHT TUBES** do not normally clog or collect moisture and foreign matter.
3. **INTERNAL FANS** keep enclosed air constantly circulat-
- ing, assuring even cooling and fast heat dispersal.
4. **EXTERNAL FAN** blows air through tubes to remove heat quickly and efficiently. Air speed keeps tubes clean.
5. **ALL ELECTRICAL PARTS ARE ENCLOSED:** Dirt cannot enter.



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ALLIS-CHALMERS

ROCK PRODUCTS, April, 1949

135

Rock Wool

Solution of Problems In

MANUFACTURING ROCK WOOL

Part four of series of articles on processing problems encountered in the manufacture of rock wool.
Suggested method for estimating cupola output

By VICTOR J. AZBE*

CUPOLA OUTPUT should be estimated in pounds of wool blown per sq. ft. of horizontal cross-sectional bed area per day. This would put cupolas of different sizes on a direct basis for comparison. For example: the Plant C 36-in. cupola has an output of 15 tons, while the 56-in. cupola in Plant B has an output of 32 tons. The difference off-hand seems great, but on the area basis the two come to 4230 lb. per sq. ft. of shaft cross-sectional area for the lower capacity 36-in. cupola, and only 3760 lb. for the higher capacity cupola.

Capacity is mainly a factor of (1) cupola cross-section (within the lining), (2) blast pressure (within the cupola), (3) blast distribution, and (4) heat requirement and fusibility of the charge.

This explains why there is such a very large difference in the weight per sq. ft. rate in the following tabulation.

lining was dissolved away, and so the probable rate was about 2100 lb.

The lining is a partial explanation for the difference in capacities of Plant "A" and Plant "B" cupolas. The main difference is due to the amount of air delivered. At Plant "B," the 4.5-in. pressure in the bustle pipe was transferred almost without loss into the cupola. At Plant "A," in spite of the high pressure in the manifold due to rather small diameter tuyeres, the air was not delivered in anywhere near the proper amount. As no one determines pressure within the cupola, this naturally was not known. The high bustle pipe pressure

If at Plant "B," 32 tons are obtained for 4½ in. of blast pressure prevailing within the cupola, then we may say the bed resistance is 4½ in. For twice the cupola capacity, gas flow would be twice as much and bed resistance four times as great; i.e. the impractical high of 18 in. Thus, in this case, 1 in. variation of pressure up or down would not have a very pronounced effect because the cupola was already operated at high gas velocity, and therefore was in the high resistance level.

By contrast, the cupola at Plant "A" was operated at a low resistance level so even a little change in pressure within the cupola would have had a decided effect. With the square rule applying, if pressure had been raised to the 4½ in. of Plant B,

Plant	Cupola Size In.	Lining Thickness 4 in.	Area Sq. Ft.	Capacity Tons Day	1				in. lb.	
					2	3	4	5	6	
				1715	2430	2970	3430	3830	4200	
A	36	—	12.5	14.7	2350	2850	3350	3850	4200	
B	56	—	17.0	22	3760	4230	4700	5170	5640	
C	36	—	7.1	16	4230	5370	6510	7650	8790	
D	36	—	7.1	19	5370	6510	7650	8790	10000	
E	52	—	14.7	40	5440	6570	7700	8830	10000	
F	54	—	15.8	—	—	—	—	—	—	
G	54	9 in.	7.1	18	5070	6200	7330	8460	9590	

As in lime kilns, the horizontal cross-sectional area is the capacity-determining dimension. As long as the air distribution through the coke bed is right, with similar conditions of charge resistance and blast prevailing, capacity will be proportional to this area.

In the case of Plant "A," due to the 4-in. refractory inner lining, capacity was poor, but not as poor as might be assumed at first. If output is, say 14.7 tons, and net diameter is only 4 ft., the output per sq. ft. is 2350 lb. Basing it on the full diameter, it would have been 1730 lb., which figure would have been poor indeed. However, the actual figure is neither of these rates of output. Much of the

was misleading and all but the correct reason, in our instance, was given for the low capacity. Then the pressure was determined and Fig. 11 reveals the great difference existing between the high and low capacity units.

This difference was greater by far than the capacity difference, and was so great because resistance to gas flow varies as the square of the velocity, meaning that for twice the desired cupola capacity, four times the pressure must prevail at the cupola base and, of course, one fourth the pressure for halved capacity.

The matter of pressure relationship to capacity should be better understood if the maximum output is to be obtained from cupolas. Performance of these two plants serves as a perfect illustration.

capacity would have been raised to 3630 lb. which is within 130 lb. of the capacity obtained at Plant "B."

The above table carries this subject further, and presents capacity pressure relationships when the cupola bed resistance is as it prevailed in those two plants.

Of course this is not applicable generally. Every cupola has its own resistance factor, depending on the nature of the charge and particularly on its fuel requirement, as it is that which determines the gas flow rate and flow resistance. Thus, theoretically, capacity of a cupola operating at half the fuel consumption would be four times as great, which could not hold true in the upper ranges at least, since it is not merely a matter of combustion and gas flow, but also time elements of mineral conversion and melting.

It seems, however, that a capacity of less than 4000 lb. should not be permitted, and that with some slags, 6000 lb. may be exceeded, and this all within an entirely practical cupola pressure of around five or six in.

(Continued on page 142)

*Consulting Engineer, Azbe Corporation, St. Louis, Mo.



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Only Cloth-Screen Type Filters will collect the really fine dust. Compared with other cloth - screen filters, Sly provides greater filtering capacity, power savings, easier bag replacement, automatic control, and effect important economies in operation and maintenance.

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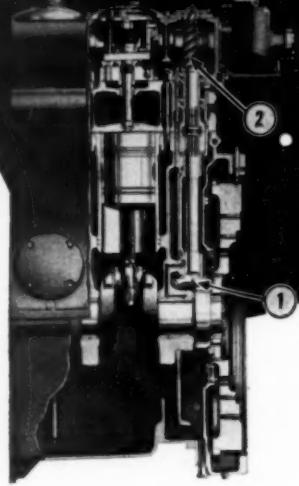
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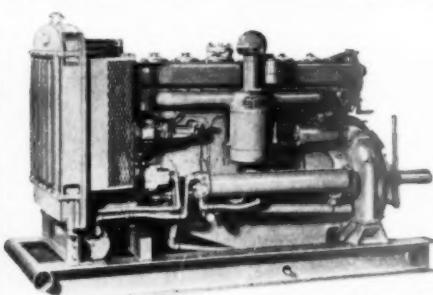
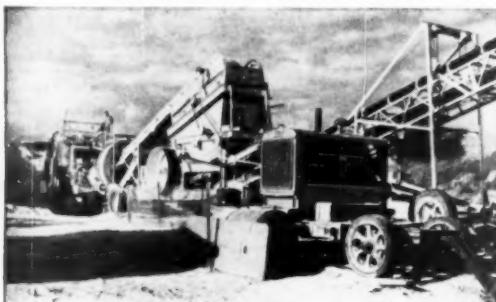
Section of the flywheel end of a Murphy Diesel. Drive for the cams is taken off the crankshaft at its point of smoothest rotation by means of a forged, case-hardened alloy steel bevel gear (1), the rotation is transmitted to the camshafts through a ball bearing mounted worm drive (2).

Two Murphy Diesels power this rock crushing plant.

In any engine the steadiest rotation of the crankshaft exists at the flywheel. By driving the camshafts from the flywheel end in Murphy Diesels, this uniform rotation is utilized rather than the uneven wear-producing rotation of the opposite end. The steady rotation of the flywheel end makes possible greater timing accuracy and longer drive life whereas the unsteady rotation of the other end imposes heavy loads on gear teeth and bearings causing rapid depreciation and wear and early, expensive replacement.

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Can you Answer these Questions about HAMMERMILLS?

Q • What are some of the important differences in various makes of hammermills?

A • First and foremost is the degree of resistance to clogging when the material has high moisture content. Other differences involve: drying costs, capacity, power consumption, range of reduction, etc. All are important in terms of greater production at less cost.

Q • What single difficulty is the one most often encountered in crushing operations?

A • "Traffic jams" frequently result through inability of the average hammermill of conventional design to resist clogging in the handling of wet, clayey, sticky material.

Q • Has this difficulty been successfully overcome?

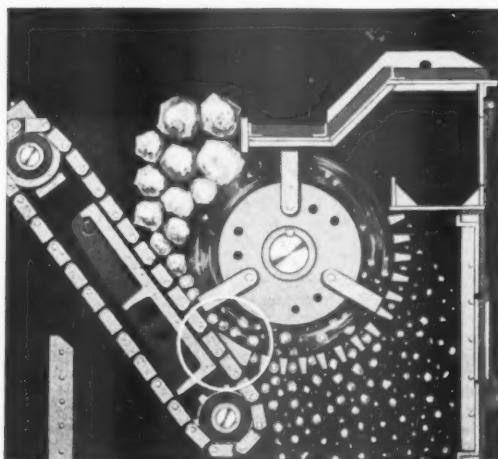
A • Yes . . . by the development on the part of Dixie engineers of a vastly improved crushing principle known as the Dixie Continuously Moving Breaker Plate.

Q • Is the Dixie Continuously Moving Breaker Plate an exclusive Dixie feature?

A • Yes . . . covered by U. S. Patents Granted and Pending.

Right! The Dixie Non-clog Continuously Moving Breaker Plate is the distinguishing characteristic of the famous Dixie Hammermill. Its time and money-saving features have practically revolutionized the reduction of raw materials in hundreds of installations all over the world. This singular record of accomplishment, proved in actual case histories, is your positive assurance that you can do it better with a Dixie.

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104 Pearl St.
New York, N. Y.

Rock Wool

(Continued from page 136)

So for higher capacity, cupolas should be greater in area, to a limit, and air pressure within the cupola should be higher, also to a limit. Air distribution does not seem to present as much of a problem, since the oxidizing zone is open and air can distribute itself readily. Although at Plant A, where the tuyeres project far into the cupola to concentrate their effort in the middle portion, the CO content of the middle portion was the highest. The CO is determined by reduction reaction above and not by the air distribution below.

Gas immediately adjacent to the wall of a large cupola is of a higher CO₂ and lower CO because the mass has been cooled along the jacket and the reduction of CO₂ to CO lowered. This is proven by the ratio of carbonate CO₂ involved in relation to other gases. CO₂ was high, but was all obtained from combustion of carbon.

A slight insertion of the tuyeres may be desirable, however, but more for preventing chilled slag from slipping down the walls across the opening and shutting off the tuyeres, than for any other reason.

The larger the cupola, the higher the likely capacity; also, the larger the cupola as long as capacity is in step with its size, the lower the heat loss to the walls will be in proportion to the total heat input. In spite of the openness of the oxidizing zone, difficulties will begin at a certain point due to poor air distribution. Inwardly projecting tuyeres seem to be the answer to the problem but, being water-jacketed, rob the zone of too much heat where it is the most valuable. Oval cupolas from all indications could be of 50-ton capacity with two taps blowing into a single chamber.

In the study of Fig. 11 it will be noted that pressure drop per unit of height is less in the lower regions of the cupola. Here material is taken away continuously. Coke is shrunk in size so that the lower regions are the loosest. This aids distribution greatly and even suggests the possibility of using smaller sized rock or slag, although one hesitates to recommend this. Certainly smaller sizes would heat faster and would present more surface for any sort of reaction. With a rock half as small, reactions would happen four times as fast, because surface is doubled and penetration would be half per unit of weight.

Of course with any size reduction, air pressure would need to be raised considerably, particularly if with the size reduction, capacity was also raised and gas flow increased. As an example, if size was reduced in half, and with it capacity doubled, pressure would be doubled for this size decrease and quadrupled for the capacity increase, together raising it eight times, or to 32 in. in the case of Plant B. It can readily be seen why experiments along

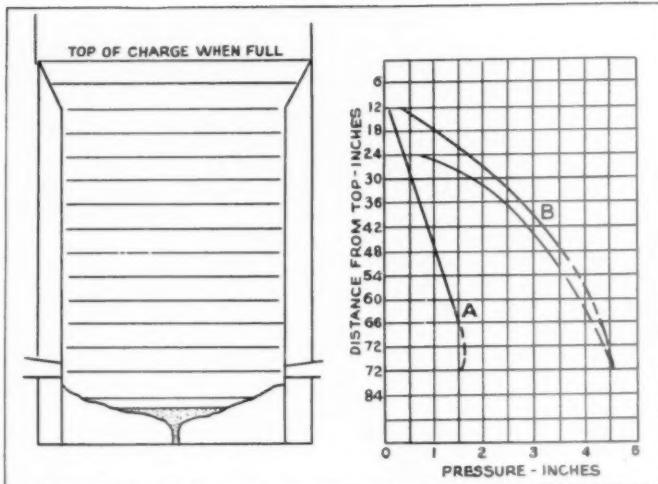


Fig. 11: Pressure drop comparison through high and low capacity cupolas

these lines may have been very discouraging. But then how many conducting these experiments considered the matter in this light?

Slags

The lower the melting point of slags the higher the cupola thermal efficiency will be. The required temperature of the slag bath is the critical temperature from which all calculations start. If the slag can be, say 100 deg. F. lower in temperature, not only will the amount of air injected and amount of coke burned be less, but the rising gases will be less so that less CO₂ will be reduced to CO.

But the lowest melting slag may not give the best wool. It should have a proper viscosity range and a high specific heat. Some slags are lacking in viscosity range like water or light oils, while others have a long viscous range like molasses or tar. They begin to soften and are no longer solid at temperatures far below those at which they can in a proper sense be called liquid, and become liquid far below the temperature at which they become free running. The limey slags in a general way belong to the former class, while the silicious slags belong to the latter.

For rock wool, the greater the difference between melting and fluidity points the better, and that would point toward lower lime and higher silicate.

Another important point is specific heat. The more heat the slag contains the slower it will cool and the longer and thinner the fiber will be.

It is hardly up to us to discuss this matter since we know so little about it, but we are forced to, for it has a bearing on cupola design and operation. While there is one desirable slag, the rock cupola does not consistently produce a uniform product and there is little one can do about it. This

is because the cupola labors with the rather coarse mixture, and its fluid capacity is so extremely small that there is little chance for blending of the many different streams contributing to the general fluid mass. For this reason, larger and higher capacity cupolas would be preferable, providing a greater number of contributory sources to the sum total of the slag, thus averaging out its composition.

It seems also that a cupola-tank combination should not be difficult to work out, as the tank would not need to be large, hardly more than a pot. Such a pot, integral with the cupola, would need no auxiliary heating means. Arrangement could be such that it would be heated by part of the gases leaving the melting zone.

A short-fibered cotton-like wool results from too high temperatures, too great a blast pressure, or both; while too low a blast pressure or temperature will result in coarse wool containing too much shot. Regulating the air supply is the only means for control of temperature at present and is not very satisfactory. There is a system, however which may be very useful in this situation — the "Aze System of Hot Zone Recirculation."

In the case of the cupola, this would be applied by withdrawing some of the gas from the mid-section and reintroducing it with the air into the fan section and thus recirculating it back to the hot zone of the cupola.

The air would be heated some by the hot gases, and most of the CO reintroduced would burn. Recirculation would be slight, but would permit adjusting the cupola for a greater melting zone height, and so for a higher capacity. That is, rather than limit the blast because of the short-fibered wool obtained, the maximum blast would be

(Continued on page 145)

AIRCOLITE — AIRCO SELF HARDENING — AIRCO TUNGTube — AIRCO TUNGserts —
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Robins Conveyors Division • **HEWITT-ROBINS INCORPORATED**



Rock Wool

(Continued from page 142)

attained and the temperature controlled by this more logical means.

While application of this system to the cupola would be new, the system is not new. It is patented and has been applied to many lime kiln installations where the product demanded a lower hot zone temperature, inconsistent with the high fuel efficiency desired. By this means the hot zone was tapped and the upper portion, which was too hot, was made cooler, and with it the active zone increased in extent.

A truly modern cupola installation would be equipped with a pyrometer indicating and recording the slag temperature, as well as automatically controlling the recirculation, and thus regulating the temperature. But even if the entire system could not be installed, a temperature indicator should be installed anyway. A special narrowly focused radiation tube pointing on the slag at the outlet, and connected to any desired pyrometer would serve the purpose.

Hearth Loss

The height of the cupola bed may be only 6 ft., but, like in the gas producer, there are many zones of distinct action and importance according to height. In respect to the rock in downward direction there are the pre-heating, calcining, sintering and melting zones, and in respect to the fuel-air component in the upward direction, there are the oxidation, reduction and cooling zones.

While heat conservation is important throughout all the zones, it is more important in the oxidizing zone than in any other. The less carbon we need to burn at this point the less CO₂ there will be to reduce, and more coke will appear at the hearth.

Hearth loss is due to moisture in the blast, cold blast, jacket loss, loss of heat through the bottom, and that due to formation of CO, to the extent that it may have formed in this zone.

It is not certain how much harm the moisture does. It may be far more than simple calculations indicate. In any case, if drying could be sufficiently easy to accomplish, air should be dried, but this could introduce complications which would be costly and not so economical.

The loss due to cold air blast is far greater. Of course, all air has to be brought up to the temperature of the critical zone, and this is accomplished by the burning of carbon. If the air could be preheated by some other means, the corresponding amount of carbon in the hot zone would be saved. To preheat the 8.06 lb. of air per lb. of carbon at 30 percent air deficiency, to 2750 deg. F., would require about 6000 B.t.u. The only source of this heat would be the CO gas which the cupola is discharging and it happens that the potential heat value of this CO gas is about this same 6000 B.t.u.

The jacket loss in the hot zone must be tremendous even though there is a film of chilled, half-solidified plastic material sluggishly flowing over the water cooled iron surface. Higher up the jacket is shielded, in a measure insulated, by partially cooled solid material, but here the space is open and all that is in this space is coke glowing at a temperature of 3100 deg. F., and radiating heat to the comparatively cold surface.

While it would be desired to retard the heat loss to the jacket throughout the cupola, it is more important to accomplish this in the combustion zone, either by a lining or by the use of high temperature fluid, or both in combination to a more limited degree.

While in the upper two-thirds of the cupola the jacket affects only the immediately adjacent layer and cools only the gases which pass stratified along its surface; in the oxidizing zone, due to its openness, it has a general effect.

Operating the cupola at a higher capacity would also help although not exactly in inverse proportion. Cupolas should be driven to the limit, not only for this reason, but also for many other reasons: lower CO loss, higher labor economy, etc.

Conservation of Coke

Coke in the cupola is only needed on the hearth. The fact that coke has to reach this point by passing through the entire column is mainly responsible for poor cupola efficiency.

In the blast furnace it is somewhat different. There some of the CO combines with the oxygen of the ore, but in the cupola it is just an element of waste.

In the blast furnace, all of the CO₂ from the oxidizing zone is converted to CO; what CO₂ later appears is from reaction with the ore and the CO₂ from the limestone. The reaction with the ore is essential, so presence of this CO is needed and nothing should be done to avoid it. This means that carbon for CO₂ reduction must be sacrificed. This does not apply to the rock wool cupola.

In the case of a mixed kiln, conditions are exactly the opposite. Here all of the coke is completely burned, and in good kilns to zero CO. As with the cupola, the coke is either charged in layers or mixed, the proportion of coke to the rest of the charge being about one-twelfth. In the case of the cupola, the proportion is only about one-third. Therefore, in the kiln, air can pass through, sneak through so to speak, and burn the CO that does form, which is all well and good as no coke is needed or desired at the base.

The cupola also could be operated with combustion complete. All that would be needed in this case would be an increased air supply, but then there would be no coke on the hearth. We could also admit secondary air and burn the CO higher up, but all this

(Continued on page 163)

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A.I.M.E. Discusses Non-Metallic Minerals

INTEREST in industrial non-metallic minerals was very evident at the annual meeting of the A.I.M.E. held in San Francisco, February 13-17, 1949. Attendance at the technical sessions of the Industrial Minerals Division and the joint sessions held in cooperation with the Minerals Beneficiation Division was outstanding proof of the trend in mineral interest.

Excellent papers and discussions covered such timely subjects of interest as resources, mineral economics, mineral aggregates and structural materials, new products, processes, techniques, phosphate, flotation practice, and flotation theory. A symposium on phosphate mining opened a lively discussion on the resources of the new western phosphate industry of Idaho, Wyoming and Montana.

One of the most important subjects of today and one of the most controversial was discussed by R. F. Blanks and Roger Rhodes, U. S. Bureau of Reclamation, in their subject, "Reactive Aggregate in Concrete." "The Present Shortage and Future Outlook of Portland Cement in the Pacific Northwest" was discussed by K. E. Hamblen, consulting engineer.

Foremost in the thoughts of all producers of industrial minerals is the subject, "Research." A. Allan Bates, Portland Cement Association, summarized "The Nature of Research Relating to Portland Cement."

Of exceptional interest, as indicated by attendance, was the paper "Fuel Economy in the Lepol Kiln" by Robert A. Kinzie, Santa Cruz Portland Cement Co.

fornia," by Charles W. Chesterman, California Division of Mines; and "Comparative Furnace Designs for the Expansion of Perlite," by John B. Murdock and Herbert A. Stein, The Perlite Corp.

Mineral Economics

Producers of industrial minerals must ever be conscious of economic factors to a greater degree than other mineral producers. R. B. Ladoo opened the discussions with his comprehensive paper "Industrial Minerals Economics and the Raw Materials Survey," by R. A. Ladoo, consulting engineer, and C. A. Stokes, director of research, Godfrey L. Cabot, Inc. Mr. Ladoo pointed out the necessity of state raw materials surveys and offered the work of Albert O. Bartell, Oregon State Raw Material Surveys, as an outstanding example of cooperation.

Other subjects of interest were: "Economic Factors in the Production of Natural U. S. Synthetic Magnesia," by O. M. Wicken, Northwest Magnesite Co.; "Economics of Western Phosphate," by Roscoe E. Bell, Bureau of Land Management; "Economics of Pacific Coast Talc," by Henry Mulryan, Sierra Talc and Clay Co.; and "Economics of the Mineral Pigment Industry," by W. M. Myers, School Mineral Industry, Pennsylvania State College.

Water

No technical meeting held in the coastal area would be complete without discussions on water resources and controversies. The scramble for water by cities and mining areas is dramatic to say the least. Latest ideas include channels from the Pacific Northwest along a coastal path to Southern California, and demineralized sea water. An excellent group of papers was

(Continued on page 148)

Mineral Aggregates and Structural Materials

Attendance was highest at technical sessions on the subjects of mineral aggregates and structural materials, new products, processes, techniques. John E. Conley and John A. Ruppert of the U. S. Bureau of Mines discussed "Recent Developments in the Manufacture of Lightweight Aggregates." This is a subject responsible for many research projects in the West and Southwest. The increasing importance of use of this industrial mineral was presented by N. S. Wagner and R. S. Mason, Oregon Department of Geology and Mineral Industries, in their paper "Lightweight Aggregate Industry in Oregon."

In addition to the pumice lightweight aggregates, bloated clays and shales are of great commercial importance in those areas where pumice does not occur. Charles H. Moore, Jr., supervisor, Geochemical and Metallurgical Department, Titanium Division, National Lead Co., and E. C. Henry, chief, Division of Ceramics, Pennsylvania State College, presented the paper "Technical Utilization of Waste Pennsylvania Slate as a Lightweight Aggregate for Concrete."

Tabulation of Total Estimated* Mineral Production in California for 1948		
	Industrial Non-Metallic Minerals	
Cement	\$ 49,670,000	1,000,000,000 bbl.
Miscellaneous Stone	38,500,000	(Sand, gravel, structural)
Clay Products	15,000,000	(Heavy clay products other than pottery and refractories)
Others (Misc.)	20,600,000	(including clay, gypsum, lime, mineral water, pumice, silica, talc and others)
Salines	29,000,000	(including borates, iodine, potash, magnesium salts, salt, soda and others)
Total	\$152,770,000	
Gold	14,647,000	(418,490 fine ounces)
Silver	82,000	(685,200 fine ounces)
Copper	81,000	(900,000 pounds)
Lead	3,940,000	(17,880,000 pounds)
Zinc	1,298,000	(9,750,000 pounds)
Mercury	801,000	(10,600 flasks)
Other Metals	2,225,000	(Goldsilicate, mica, iron ore, manganese ore, molybdenum ore, platinum group metals and tungsten ore)
Total	\$ 23,612,000	

*California Mineral Information Service, Vol. 2, No. 2, February 1, 1949.

Pumice and perlite were actively discussed in the following groups of technical papers under the subject heading of New Products and Processes: "Pumice in New Mexico," by E. C. Anderson, New Mexico Bureau of Mines; "A Geologic Study of the Perlite and Pumice Deposits of Cali-



Industrial Minerals Division Luncheon at the 77th annual meeting of the American Institute of Mining and Metallurgical Engineers held in San Francisco.



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Non-Metallic Minerals

(Continued from page 146)

presented at the symposium on phosphate mining. Since our greatest future reserves of phosphate are located in the three states—Idaho, Montana and Wyoming—interest at this meeting was keen. Adequately covering the resources and milling practice were papers by many active leaders of the phosphate industry.

The technical papers were: "Geological Studies of the Western Phosphate Field," by V. E. McKelvey, U. S. Geological Survey; "Mining Phosphate Rock at Conda, Idaho," by T. C. Russell, superintendent, Fertilizer Department, Anaconda Copper Mining Co.; "Anaconda Phosphate Plant, Beneficiation and Treatment of Low-Grade Idaho Phosphate Rock," by R. J. Caro, superintendent, phosphate plant, Anaconda Copper Mining Co.; "Surface Strip Mining at Leef, Wyoming, and Montpelier, Idaho," by R. J. Armstrong, superintendent, and J. J. McKay, Montana Phosphate Products Co.; "Surface Mining Operations Near Fort Hall, Idaho," by Heath B. Fowler, Simplot Fertilizer Co.; and "Phosphate Deposits of the Northwestern United States," by Dr. Frank R. Hunter, International Minerals and Chemical Corp.

Florida Phosphate

Latest developments at the new and largest phosphate plant in the world were discussed by Dr. I. M. LeBaron, chief of ore dressing and associates, International Minerals and Chemical Corp. Subjects included "The Noralyn Phosphate Concentration Operation"; "The Use of Rotary Trommels for 28-Mesh Sizing"; "The Use of Humphrey's Spirals with Reagentized Feed"; and "The Hydro-Operation on Phosphatic Slimes."

Variety in Non-Metallic Interest

New uses in drilling muds, ceramics, stratospheric lubrication, electronics, agricultural insecticides, and nuclear energy control prompted this variety of subjects for discussion: "Processing of Southwestern Barite and Barite-Fluorspar Ores," by J. Bruce Clemmer, G. H. Roseveare and Carl Rampacek, U. S. Bureau of Mines, Tucson, Ariz.; "Talc—A Magnesium Silicate Paint Extender," by Richard S. Lamar, Sierra Talc and Clay Co.; "Guide for Buying Domestic Muscovite Mica," by B. C. Burgess, Appalachian Minerals Co.; "Flotation of Lepidolite at Keystone, S. D." and "Flotation of Spodumene at Tinton, S. D.," by A. I. Johnson, consulting mining and metallurgical engineer.

Geology of Industrial Minerals

Always subject to controversy is the subject of origin and exploration for mineral deposits. A session on the geology of industrial minerals in-

cluded such subjects as: "Photo-Geology—A Tool for Mineral Development," by Richard M. Foote, Franklin and Marshall College, and R. C. Stephenson, Pennsylvania Geological Survey; "Brazilian Ilmenite Sands," by Joseph L. Gilkon, E. I. duPont de Nemours & Co.; "Geology of the Titanium Deposits of the Magnet Cove Area, Arkansas," by D. F. Holbrook and V. C. Fryklund, Arkansas Resources and Development Commission; "A Northwest Strontium Mineral Deposit," by William E. Caldwell and G. H. Waterman, Oregon State College; "New York Tales—Their Geologic Features, Mining, Milling and Uses," by A. E. J. Engel, California Institute of Technology; "California Tales," by Lauren Wright, California Division of Mines.

Flotation Practice and Theory

The sessions on flotation practice and theory have become synonymous with the activities of the Mineral Beneficiation and Industrial Minerals Divisions. This is evidence of the extreme importance of froth flotation processes to producers of industrial minerals. Cheap processes to concentrate the increasingly complex non-metallic ores are essential. Froth flotation is one of the most important processes developed in recent years and is directly responsible for extending the life of our mineral deposits, for making new mineral concentrates available and for offering unlimited possibilities to mining and milling operators who have for years been throwing away valuable minerals in their mill tailings or quarry wastes.

This year the subject warmed up on: "Flotation at Coronado Copper and Zinc Company," by George A. Freeman, mill superintendent, Coronado Copper and Zinc Co.; "Copper and Molybdenum," by Charles Henry Curtis, chief research metallurgist, Miami Copper Co.; "Barite Flotation," by George H. Roseveare, metallurgist, Arizona Bureau of Mines; "Flotation of Copper Silicate from Silica," by R. W. Lutd and C. C. Dewitt, Michigan State College.

Discussions on flotation theory were so well attended that room was at a premium. Some excellent studies were presented. Those by Dr. S. R. B. Cooke and Dr. M. D. Hassialis were full of food for thought. The session included: "Fluorite Flotation I: Development of New Flotation Technique," by J. Hugh Hamilton, director, Utah Experiment Station, J. W. Johns, Jr., The Carborundum Co., and Harold Bradford, Utah Experiment Station; "Fluorite Flotation II: Theory of Oleic Acid Collector Action," by Melvin A. Cook, Professor of Metallurgy, University of Utah, and Arthur W. Last; "Studies on the Activation of Quartz with Calcium Ion, I and II," by S. B. R. Cooke, Professor, Minnesota School of Mines, and Marcus Digre, metallurgical engineer; "Mobility of Collector Ions and Effect

Upon Induction Time," by Claude G. Myers, M. D. Hassialis, and A. F. Taggart, School of Mines, Columbia University; "Mechanism of Collector-Mineral Attachment in Flotation," by Melvin A. Cook, University of Utah.

There is never enough time to fully discuss flotation theory. Usual procedure calls for sleeping on the arguments and resuming the discussions in a cleanup session the following day. Our hope for the future lies in research. The research mineral engineer has countless mineral concentration problems ahead of him if we are to continue to maintain our leadership in a world economy so dependent on metals and non-metallics alike. With the depletion of our high grade easily won mineral deposits, the research engineers will be hard set upon to match their ingenuity with the capriciousness of Mother Nature.

Portland Cement Production

PRODUCTION of finished cement in December, 1948, as reported to the Bureau of Mines, was 17,425,000 bbl., representing an increase of 8 percent over the production figure reported for December, 1947. Mill shipments totaled 12,741,000 bbl., an increase of 3 percent over December, 1947, while stocks of 11,083,000 bbl. on December 31 were 11 percent above the December, 1947, totals. Clinker output in December, 1948, amounted to 18,624,000 bbl., representing an increase of 9 percent over the corresponding month of the previous year.

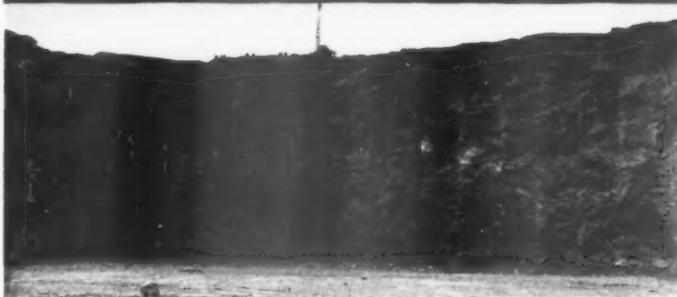
Production during the entire year of 1948 was 205,424,000 bbl., an increase of 10 percent over the previous year's total and a new all-time high for the industry. Production reached 14,541,000 bbl. in January, declined slightly in February, increased to 19,349,000 bbl. in October and declined slightly in November to 18,435,000 bbl. in December. Production of clinker in 1948 amounted to 207,545,000 bbl., an increase of 11 percent over 1947; and shipments reached 204,329,000 bbl., an increase of 9 percent over the 1947 figure and an all-time record high.

Welding Specifications

FOUR new specifications for arc-welding electrodes have been completed by the Committee on Filler Metal, jointly sponsored by the American Welding Society and the American Society for Testing Materials. The specifications include the tentative specifications for: mild steel arc-welding electrodes, iron and steel arc-welding electrodes, corrosion-resisting chromium and chromium-nickel steel welding electrodes, and copper and copper-alloy metal-arc welding electrodes. Copies of the specifications may be obtained from the A.S.T.M., 1916 Race Street, Philadelphia 3, Penn.

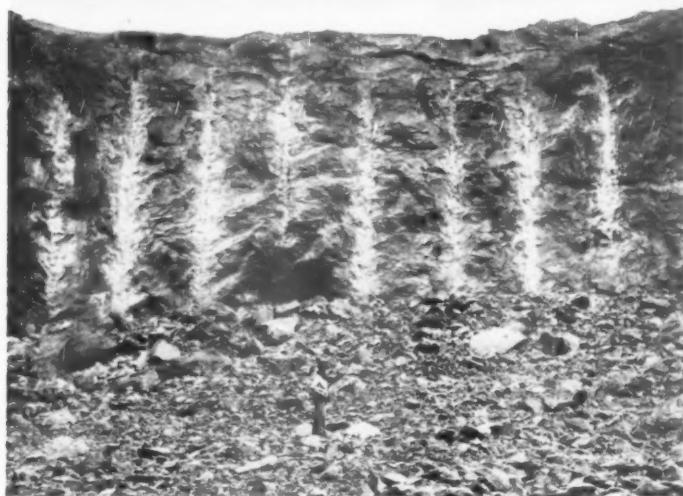
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Circuit wires are attached to a Du Pont Blasting Timer offering a selection of delay intervals ranging from .010 to .025 second, producing a blast that "peels" rock from the quarry face with greatly reduced vibration.



As the final operation before firing, caps are attached to Pramacord above ground and the Timer is connected to power line with remote firing switch.



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†Trade-Mark for Du Pont ammonium nitrate blasting agent.

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Ohio Gravel Association

Annual Meeting

ANNUAL MEETING of the Ohio Sand and Gravel Association, held February 1 in Columbus, was highlighted by the report of Claude L. Clark executive secretary, and the address of T. J. Kauer, Director of Highway Department.

Mr. Clark began by saying, "This is a legislative year. The Ohio General Assembly is in session. During this week and next, there is sure to be an avalanche of bills introduced in both the House and Senate. How many of those bills will directly concern the sand and gravel industry, I don't know, but the activities of the legislature must be closely observed less something creeps in that is detrimental to the industry. Subjects of concern are taxation, strip-mining, highway and motor vehicle legislation.

Division Report

"I have again called upon the Division of Safety and Hygiene for a report on the experience record of the sand and gravel industry during 1948. The letter I received signed by James H. Fluker, Superintendent of the Division of Safety and Hygiene of the Ohio Industrial Commission; reads, in part, as follows:

"Regarding your inquiry relative to the accident experience of your group during 1948, I would say that our records show that both accident frequency and severity increased sharply.

"As was suggested in a similar letter to you last year, this adverse experience is being reflected in the basic premium rates for your group. In 1948 it has increased to \$2.72. Inevitably, the adverse experience of the latter year will show up in the form of higher rates later on. These figures are based on the experience under Manual 4000, which governs the greater part of your operations.

Mr. Clark urged members to enroll in the safety campaign carried on by the Division of Safety and Hygiene at no cost to the industry or association. He called attention to the All Ohio Safety Congress sponsored by the Division of Safety and Hygiene and being held April 12-14 of this year.

Business Outlook

In discussing business outlook, Mr. Clark said, "The year 1948 was election year, and has caused some to be fearful, but, business momentum on account of post war needs was under full steam. Especially was this so in the construction industry. From our observations following talks with our members, and others, the producers of sand and gravel have had another good year. As for 1949, we see no reason

for a noticeable decline in the market for sand and gravel.

"In reading reports as to 1949 prospects for business in the building field we are advised that a slight recession in the home building field can be expected as compared with 1948. Our office receives the report of the State Treasurer each week carrying a break-down and analysis of revenue from the sales tax. The reports as received each week during 1948 show 23.8 percent increase in sales tax on building materials as compared with 1947. The report for the first two weeks in 1949 as compared with the report in 1948 shows a decline of almost 30 percent. Industrial building may not be quite as heavy in 1949 as compared with 1948, but will still be sufficiently high as to be a major factor in construction work.

"Construction of public buildings, schools, etc., should be a major factor in acting as a stimulus for construction work during 1949. I base this claim on two factors: First, there is quite a backlog of projects previously financed and which were started during 1948 and which remain uncompleted; and second, we are advised by the office of the Secretary of State that the outcome of Ohio Building and Bond issue improvements voted on was that approval was given by the voters to the extent of 252 projects, with a valuation of almost \$92,000,000. A majority of the issues were for school purposes—buildings, sites, additions—and were scattered generally throughout the state. In analyzing the approved projects we find: 150 projects approved for schools, buildings, sites, etc., totaling \$47,882,700; 23 projects approved for sewage and waterworks totaling \$8,377,500; 13 projects approved for streets and bridges totaling \$11,847,500; 9 projects approved for hospitals totaling \$7,640,000; 14 projects approved for public buildings totaling \$2,310,000; 1 project approved for airport totaling \$9,000,000; 37 projects approved for fire housing and equipment totaling \$713,000; and 2 projects approved for parks and playgrounds totaling \$4,025,000.

Road and Streets

"Under the heading Roads and Streets permit me to say first, gasoline tax revenue was considerably more in 1948 than in 1947. We are advised that the receipts from the motor vehicle tax show a sharp increase as compared with 1947, and that 1948 receipts will exceed \$40,000,000. Thus the combined total from the gasoline tax and motor vehicle tax supplied Ohio's political subdivisions with approximately \$110,000,000 for 1948. This together with the State

appropriations from the general fund, to the State Highway Department and Federal Aid appropriations, gave to Ohio one of its peak years in expenditures.

"Before closing my remarks on highways, we are advised that there is a carry-over program in excess of 45 million dollars from contracts awarded in 1948. This carry-over program is the largest in history. With this carry-over program, and with gasoline tax and tag tax revenues holding up in 1949 as compared to 1948, Ohio should have another heavy road and street program."

Highway Program

T. J. Kauer opened his address by saying, "As Director of highways of this great State of Ohio, I am indeed honored in being privileged to speak to this association. The majority of Ohio citizens are earnestly concerned about the state's highways, because they do realize that improving and maintaining our vast network of highways is of vital importance not only to the welfare of the state, but to national security as well.

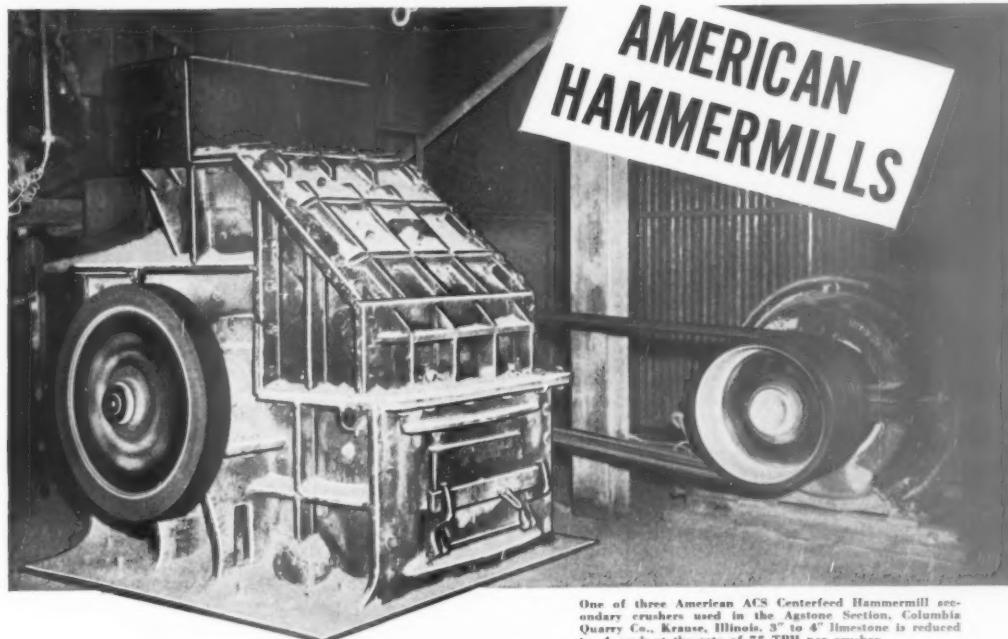
"Numerous states have a modern system of arterial highways, but their secondary roads are wholly inadequate. In contrast, we in Ohio are faced with the task of maintaining the present secondary roads which have proven to be adequate and satisfactory, in addition to constant improvement of the arterial system. Therefore, maintenance crews should be concentrated on projects needing immediate improvement, which have been impaired by weather conditions and large volumes of vehicular movement. Those areas which have been neglected as a result of lack of personnel, time element, or geographical location should also be given definite consideration.

"In accordance with the need for the modernization of our existing network of roads and highways, we now have a mammoth construction program underway, and are continuing the preparation of new plans for a resurfacing and maintenance program, to begin at the earliest date permitted by weather conditions.

"A contract has recently been entered into between the department of highways and the Automotive Safety Foundation of Washington, D. C. This unbiased organization is in the process of conducting a survey to determine the extent of needed improvements of our existing township roads, city streets, county roads, and state highways, also expressways to handle large volumes of traffic movement. This survey should be advantageous in that it will enable us to provide a plan for the best possible system of highways to meet the needs portionment with automotive progress, of our motorists. I firmly believe that when highway designing is in progress, the decrease in accident fatalities will be tremendous.

(Continued on page 152)

BETTER SIZE CONTROL . . . MEANS GREATER EFFICIENCY AND PROFIT with

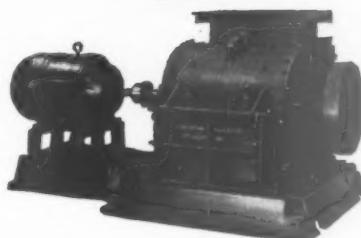


One of three American ACS Centerfeed Hammermill secondary crushers used in the Agstone Section, Columbia Quarry Co., Krause, Illinois. 3" to 4" Limestone is reduced to -4 mesh at the rate of 75 TPH per crusher.

FLEXIBLE . . . to give a proper ratio of sizes to meet your stockpiling and current market demands. **DEPENDABLE . . .** for uniform, individual size control at high tonnage, year after year. One man size stone or screen rejects are rapidly reduced to uniform roadstone, aggregate or agstone sizes — with no fingerstones or slivers. From season to season . . . and from agstone to roadstone peaks . . . these operating advantages of American Hammermills add up to make every reduction operation more efficient and more profitable.



"30 Series" American.
Capacities up to 100
TPH.



"24 Series" American.
Ideal for production
requirements up to 30
TPH.

Write for free "Better Stone Crushing" Bulletin.

American

PULVERIZER COMPANY

Originators and Manufacturers of
Ring Crushers and Pulverizers

1245 Macklind Ave.
St. Louis 10, Mo.

Cement Company Honors 25-Year Employees

Huron Portland Cement Co., Detroit, Mich., held its Quarter Century Celebration and superintendents convention at its Alpena, Mich., plant March 15-17, with representatives from each of the company's 12 plants present.

Highlight of the annual gathering was the presentation of gold watches by Emory M. Ford, president of the Huron Portland Cement Co., and Wyandotte Chemicals Co., to employees who completed their 25th year with Huron during 1948.

The presentations brought the number of watches given to Alpena mill employees to 195. More than 19 percent of the present active employees at the Alpena mill have been with the company more than 25 years, and eleven men still on active service have been with Huron for more than 40 years.

Another feature of the celebration was an inspection, by the plant superintendents, of additional facilities which have been installed at the Alpena plant. The newly completed multi-million dollar expansion program at Huron has resulted in what is claimed to be the largest single cement mill in the world.

In addition to discussions on plant operating problems and safety campaigns, interest centered on the new Huron Airlslide method of moving bulk powdered materials. The method is based on the principle of aerating the material through a slightly inclined, porous medium, the medium in this case being a woven canvas fabric which remains stationary. The low pressure air filters up through the fabric and forms a cushion between the belting and cement, and at the same time aerates the cement to the extent that it flows like water down the slightly inclined chute. A slope of only 4 deg. is adequate.

The use of the Airlslides is said to eliminate the use of old-fashioned conveyors and the large drives necessary to run them. Huron plants and mill now are using over 3000 ft. of Airlslide conveyors which move over 40,000 tons of material a day.

In addition to plant conveyors, the system has been successfully introduced to the transportation field, Mr. Ford stated. One of Huron's steamship fleet, the S.S. Samuel Mitchell, has been outfitted as a self-unloader with the Airlslide units throughout for emptying rows of huge bins.

The Fuller Co. has been licensed to manufacture the Airlslide for commercial purposes, and Gramm Trailer Co. has exclusive license to manufacture aerated trailers and is doing so in a wide range of sizes and types. These trailers are proving to be successful for hauling bulk cement and other pulverized materials. An air unloading truck is said to unload cement at any desired rate up to a maximum of 125 bbl. in 4 min.

Cement Officials Predict Continuing High Production

OFFICIALS in the cement industry stated recently that the industry is counting on widely predicted and anticipated rise in public works construction to maintain its operations this year at the same high level established in 1948. The men said that boost in publicly financed building should balance any decline in demand resulting from a lower level of operations in home construction, and thereby maintain cement sales and output. The forecast is said to be "conservative." There is a possibility that the cement industry may find even a broader base of demand this year than in 1948 because of the changing composition of total construction volume. Usually, more of the building dollar used in public works goes for cement than in home building, especially in the case of highways, dams and conservation projects. Further increases in this type of construction are reported by federal and local governments, and this rise in public building should be more than sufficient with respect to total volume to offset any declines in home building, one official said.

Cement producers, however, do expect a weakening in demand in some areas. West Coast demand is said to have declined markedly. One cement executive estimated that cement output on the West Coast exceeds demand by 3,000,000 bbl. per year. Local shortages also are expected. In one area, regional supplies were so low, cement had to be imported.

Glamourize Your Agstone

(Continued from page 125)

their booth representing a cool spot on the usually hot fair grounds. The booth is furnished with ice-water, cups, chairs and electric fans. The back-drop of the booth carries posters



Typical booth poster such as this is used in county fair exhibits

lettered with company slogans; there are supplies of literature; balloons for the children, pencils for the men and thimbles for the ladies—all imprinted with the company name and an appropriate slogan. Frequently an agronomist from the University of Iowa is invited to the booth to conduct soil tests.

Trucker Salesmen

Approximately 50 percent of all orders originate with the truckers,

who own the trucks they drive and work as independent operators. Imprinted thermometers are still another form of advertising used by this company—with the thermometers bearing both the company name and the name of the trucker, who contributes half of the cost of the item. In this way, the partners feel, the truckers identify themselves more closely with the business and are more careful in distributing the thermometers. Every year a dinner is held by the company for the truckers and their wives. At this time company management takes the opportunity of emphasizing points about agstone that should be brought out in customer contacts, thus aiding the truckers to better salesmen.

According to the two partners, proof



One of eight similar road signs in the area surrounding the quarry

that their merchandising program pays is to be found in the fact that the volume of company business did not drop off last year when the conservation payments were temporarily halted, as was the case with so many other agricultural limestone producers.

Ohio Gravel

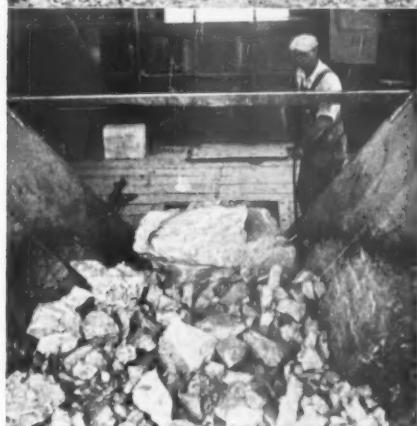
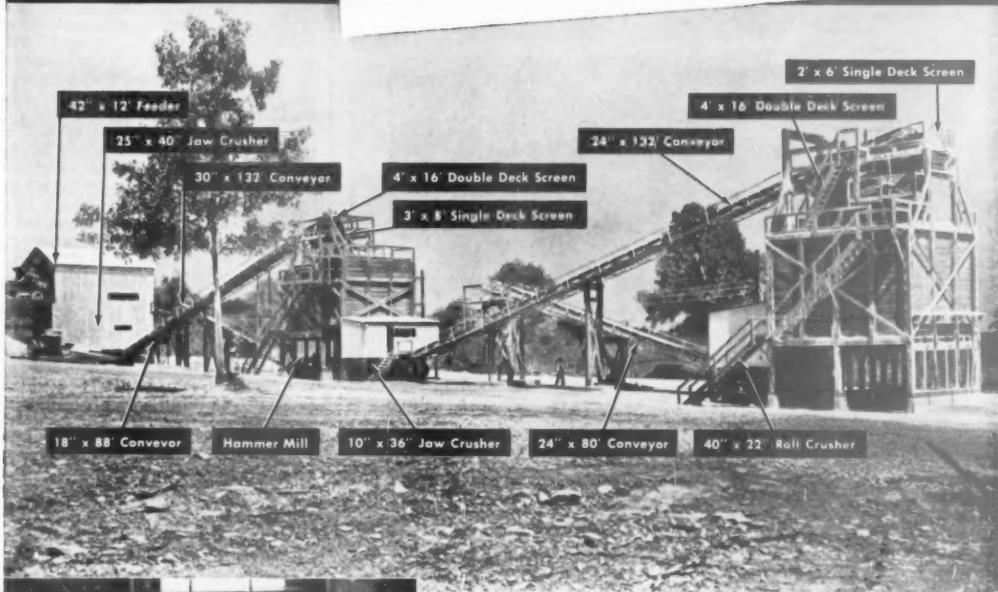
(Continued from page 150)

"Through serious study of past surveys, proper preparation of blueprints for the orderly development of modernization of our state system, concentration of intensified efforts, and complete co-operation with outside related interests, the achievements should and will be numerous. I am of the opinion, that through this method of operation, the inevitable will be an exceptional system of highways, of which we may all well be proud, and which will most effectively serve the public interests."

Canada Asbestos Output

ASBESTOS output in Canada increased by more than a hundred thousand tons in 1947 over 1946, all production coming from Quebec Province, according to *Mineral Trade Notes*. Some 662,533 short tons valued at \$31,847,135 were produced during 1947 as compared with production of 558,181 short tons valued at \$25,240,562 in 1946.

Engineered for Two-Man Operation



The hopper above the Apron Feeder which serves the Primary Crusher is 10 feet wide, 14 feet long and 4 feet deep; has a capacity of 15 tons of stone.

This Indiana Limestone Plant, with its two Jaw Crushers and Roll Reduction Crusher, is typical of the efficiency of design, construction and operation that characterizes every Austin-Western Crushing and Screening Plant. But two men are needed; one at the Primary Breaker; the other to make the rounds of the crushers, screens and conveyors. Varying quantities of various sizes of material are produced, according to trade demands. The Hammermill is used to increase the output of agricultural limestone.

Properly matched crushers, conveyors and screens eliminate bottlenecks and insure maximum, uninterrupted production.

Each Austin-Western Stationary Plant is "tailor-made" for the job. Our Engineering Department will be glad to suggest the size and type of Plant best suited to your requirements.

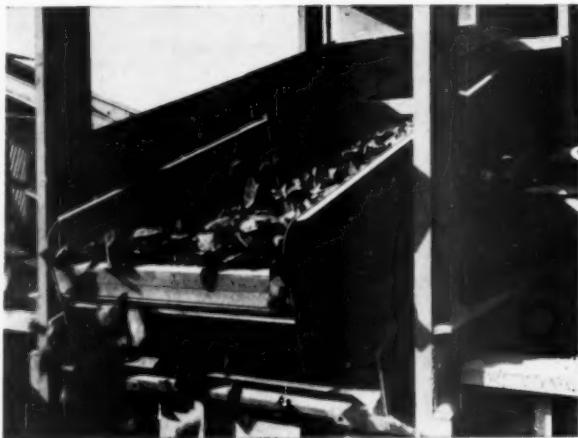
AUSTIN-WESTERN COMPANY, AURORA, ILL., U. S. A.

BUILDERS OF ROAD MACHINERY
Austin  **Western**
 SINCE 1859



**"For best screening results
and least maintenance
you can't beat SECO"**

Harvey N. Clark

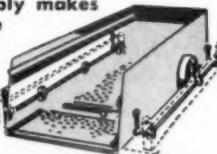


We are screening 3,000 tons of stone per day with SECO Screens

We set up our plant for volume production — we don't want to lose a day due to equipment breakdown. That's why through the years we've come to rely on Seco vibrating screens for every screening operation in our plant. We now have twelve Seco's screening everything in our plant from Ag-line up. We have not touched one this year — not even for a minor adjustment. Signed, Harvey N. Clark, Dolomite Products Corp., Rochester, N. Y.

SECO'S patented Equalizer Assembly makes the big difference in performance

This exclusive Seco engineering feature controls the true circular motion of the screen to produce greater tonnages of accurately screened materials.



YOUR SCREENING PROBLEM IS INDIVIDUAL TO US!

Let Seco engineers study your screening requirements and recommend the right screen or screens for your job! Over 250 models. Write Dept. M today for the Seco Catalog 203 and the name of your nearest distributor.

SECO

SCREEN EQUIPMENT CO., INC., BUFFALO 21, NEW YORK
In Canada: United Steel Corp., Ltd., Toronto

THE TRUE CIRCULAR ACTION VIBRATING SCREEN

Labor Relations

(Continued from page 73)

cooperative. I cannot, though, agree that such conduct on the part of the citizen ought to, or does, confer unconstitutional powers upon an agency of government. It is only where the citizen and the government come in conflict that the real value of constitutional rights appears. It is only because in the American way of life a free man is one who knows his rights, and, knowing, dares maintain them that the American Constitution has been, and will continue to be, more than a scrap of paper, that constitutional government has been, and will continue to be, a reality here.

"Whenever, then, a citizen and a government agency are in conflict in the courts, three paramount considerations must be ever kept in mind. These are: (1) 'Arbitrary power and rule of the Constitution cannot both exist'; (2) the burden is on the agency to establish, not upon the citizen to overthrow, the agency's claim of power; and (3) a court must not permit its writs and decrees to be written large for it, it must frame them for itself precisely and with the utmost care. If its writs and decrees are framed under Constitutional principles to grant the necessary relief, avoiding not only harsh and oppressive, but unnecessary and unreasonable restraints and compulsions, neither agency nor citizen may complain. For more than this cannot be required of a citizen. Less than this will not suffice."

Sand and Gravel

(Continued from page 101)

tration) with highly volatile petroleum distillates such as naphtha or gasoline. The medium-curing cutbacks (MC) are similarly produced both with distillates, such as kerosene, or light fuel oils. The slow-curing (SC) may be crude or partly refined petroleum, or they may be blends of asphaltic materials with non-volatile petroleum distillates such as gas oil. He said the most common asphaltic emulsion was the oil-in-water type in which small globules of asphalt are held in suspension in water by means of an emulsifying agent. They contain from 55 to 65 percent asphalt. Inverted asphalts, he said, were of the reverse type, i.e., globules of water suspended in asphalts. They contain 8 to 16 percent water and have limited use.

The speaker brought out that emulsions are supplied in several grades which differ from each other in the rapidity with which the water and asphalt separate when in use. They are all liquids and do not require heating. They will coat wet or moist aggregates.

Similarly, the speaker told of the road tars and of the grades and types furnished to the trade. They range from light to heavy and some have to be heated to use them properly. He

also described the three broad types of bituminous construction, listing them as, surface treatment, bituminous macadams, and bituminous mixtures.

In all types of bituminous construction, the speaker pointed out, the aggregate constituted 90 percent or



Fred Barzel, assistant director of engineering, N.S.G.A., chats with R. V. Roupe, Des Moines.

more of the materials used, and therefore that the integrity of the pavement can be greatly influenced by the aggregates used. He said it was necessary that the aggregate not crumble under the rollers used, and later by the traffic, but that if an aggregate did stand up well under the roller, it probably would give a good service record. He said the Los Angeles rattle test was much used and that in any given area, the aggregate used should be that which gives the best rattle ratings at reasonable costs. For surface treatments and penetration macadam, he said that the maximum permissible loss in the rattle test was from 20 to 40 percent. For some low-type construction, the loss may be as high as 50 percent. For high-types of bituminous concretes, he said the allowable loss is usually 40 percent or less but in some dense mixtures it may be in the 50 percent range.

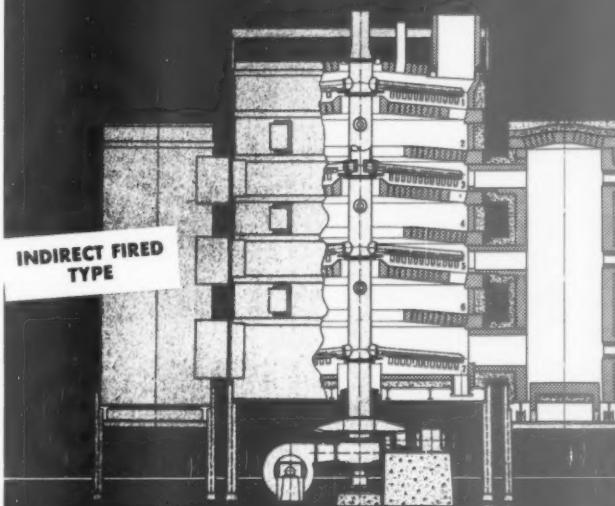
He said one important cause of black top road failures was stripping, and described stripping as the loosening of asphalt (in the presence of water) on the aggregate and therefore loss of adhesion. This is prevalent

(Continued on page 156)



Brig. Gen. G. J. Nold, Corps of Engineers, left, with Harris M. Snyder, Buffalo, N.Y., chairman of meeting

NICHOLS designs meet specific needs



INDIRECT FIRED
TYPE

Indirect fired multiple hearth furnace—one of the many modifications of the Nichols Herreshoff and Bethlehem Wedge Roasters.

This type furnace is particularly efficient where special applications require that burner flames do not impinge upon the materials processed through the furnace. Insures a furnace product uniformly processed. This type of construction is also an advantage when processing at relatively low temperatures.

By burning fuel in the combustion towers, complete combustion of the fuel and simpler and better control of the composition of the gases of combustion are possible.

The combustion towers also provide a means to blend the combustion gases with other gases that may be required for a specific chemical reaction, before the hot gases are introduced into the furnace hearth spaces.

The indirect fired type furnace is used for such products as activated carbon, filter aids, soda ash calcining, some reducing roasts, etc.

Ad No. 2 of a series on special designs. Watch for No. 3

NICHOLS ENGINEERING & RESEARCH CORP.

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Here's Why Mining Engineers Prefer **NAYLOR Light-Weight PIPE**



Where ventilating and water lines must be installed in limited space, mining engineers have found the answer in the combination of Naylor light-weight pipe and Naylor Wedge-Lock couplings. The light weight of this pipe makes it easier to handle and install. The practical design of the Wedge-Lock coupling permits the line to hug the wall and further speeds installation since joints can be made up with only one side of the pipe in the open. And the result is a line made tight and extra safe by the exclusive reinforced structure of the Naylor Lockseam Spiral-weld. Sizes from 4" to 30" in diameter.

Naylor
Pipe

NAYLOR PIPE COMPANY

1237 East 92nd Street, Chicago 19, Illinois
New York Office: 350 Madison Avenue, New York 17, N. Y.

Sand and Gravel

(Continued from page 155)

with certain types of aggregates, and not with others. He said that those aggregates which strip have a greater affinity for water and those are called hydrophilic. Those that have a greater affinity for bitumen than water (and hence do not strip) he called hydrophobic. He described tests for studying the effects of water on bituminous-coated aggregates.

Mr. Kelley said that the quality of the sand and mineral fillers used was important and in some cases more important than the coarse aggregates. Silica dust, he said, was definitely an inferior filler. He also described anti-stripping agents and said that their basic qualifications were those of wetting agents which make it easier to coat wet particles of aggregate with bituminous materials. He said that anti-stripping additives were quite effective on some cutback asphalts, and that all aggregates were not equally affected by these wetting agents. He dwelt at some length on this phase of the problem. He said that density and stability are two of the important considerations in black top roads and that the density of the mix is almost entirely dependent on the aggregate. Stability depends on the interlocking ability of the aggregates in the road and this in turn on the gradation and shape of the particles. He dwelt on the specifications relating to crushed gravel, gravel, slag, crushed stone, etc.

In the discussion that followed, Irving Warner, Jr., asked regarding the pH of aggregates and the effect of pH on the hydrophilic and hydrophobic properties. It was answered by Stanton Walker that aggregates with a pH of minus 7 acidic were hydrophilic and those of plus 7 (alkaline) were hydrophobic. Mr. Warner pointed out that additions of small amounts of hydrated lime can be effective and will lower the pH of the mix. Mr. Walker asked if additives might be eventually used to improve mixes and the speaker said that there were definite possibilities and that use of hydrated lime, for instance, increased resistance to water in bituminous mixes.



H. Hershey Miller, Pennsylvania Sand and Gravel Producers, Harrisburg, left, and J. C. Hoeveler, Pittsburgh, Penn.

Taxation-Zoning

At the conclusion of the National Sand and Gravel Association sessions, the committees on taxation and on zoning, land rehabilitation and stream pollution submitted their reports. Chairman J. Rutledge Hill of the committee on taxation said that the transportation tax constituted a serious threat because of overhanging liability penalties that are retroactive. Repeal is sought and, he said, contact will be necessary with congressmen and senators if there is any hope of securing repeal. The committee has decided to do nothing at present in attempts to secure percentage depletion.

W. E. Hole, chairman of the committee on zoning, land rehabilitation and stream pollution, advocated that every attempt be made to sell the industry and its contributions to the public. Zoning should be investigated at the local level and the knowledge gained transmitted to the national association. The committee will continue active.

He said that the present situation was "crystal clear confusion" and said that the Johnson Bill which has been introduced would clear up a very complex and confusing situation. He said there was some talk in legislative circles of a moratorium being declared regarding methods of selling that would enable producers to proceed without unnecessary penalties being imposed because of selling and pricing methods.

Conservation

(Continued from page 106)

In connection with the question of area needs, the preceding table is of interest. It shows the estimated agricultural limestone needs, as reported by the farmer A.C.P. committees, and the amount used under the program in 1947.

The given estimates, of course, relate only to agstone needs. They show that, on the basis of committee surveys by counties, at least 60 million tons of lime are needed annually if a complete conservation job is to be done. And a complete conservation program involves a lot of practices other than lime application. In planning a constructive, well-rounded national conservation program, we must of course consider the related needs of all sound practices, and the supporting measures necessary to make them effective.

It will be better for farmers, and in the long run for the limestone and fertilizer industries, if more attention is given not only to getting larger amounts of lime and fertilizer on the land, but also to getting maximum results from the use of the material. In reaching this objective, the agricultural limestone trade has a responsibility.

(Continued on page 158)



Below: Deister 3'x8' four-deck Vibrating Screen atop the rugged stone bins of the Independent Sand and Gravel Company, Inc.
Left: Washed gravel plant showing conveyor which carries material to the Deister 3'x8' Screen located in the top building.



Seven Years of Operation ...one bearing replacement

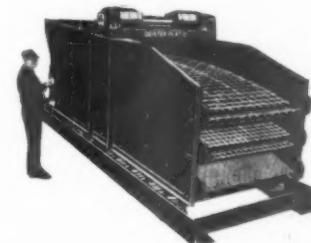
Two Deister Screens have given Independent Sand & Gravel Company, Inc., Newton, O., a combined total of more than seven years of reliable operation...with one bearing replacement and routine screen cloth changes the only maintenance.

John Fogle, general manager, says: "The two Deister Screens we have are doing a very good job on both screening and maintenance. We

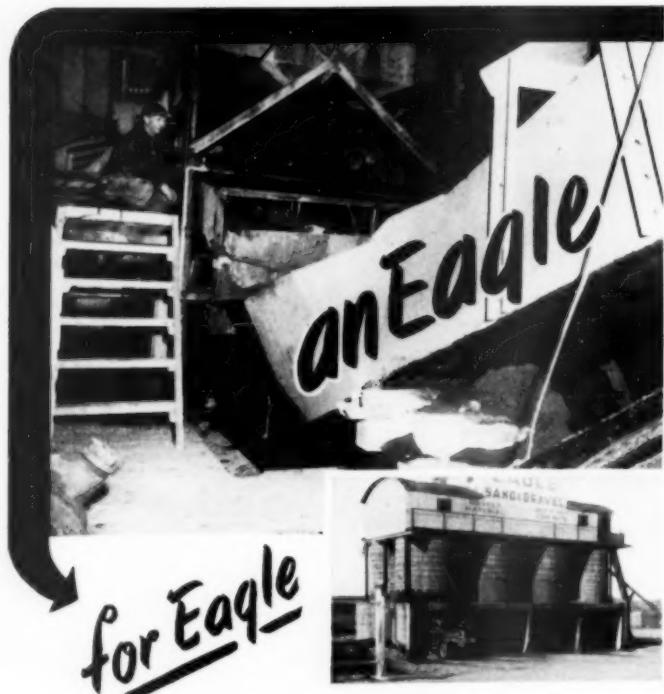
have only had one bearing to replace in four years. When we replace either of the screens, it will be with another Deister."

One of the 3'x8' four-deck screens handles the primary screening job in the washed gravel plant, producing around 60 tons per hour of 1½-inch, 1-inch, torpedo and sand. The second Deister Screen handles the output of the crusher in the crushed stone plant approximately 40 tons per hour.

The efficiency and low up-keep of Deister Vibrating Screens has been cited many times by statements such as Mr. Fogle's. Their rugged, all-welded construction, with only two bearings, assure maximum production and minimum maintenance throughout long service life. For complete information, write the Deister Machine Company.



DEISTER
SCREENS
DEISTER MACHINE CO.
FORT WAYNE 4, INDIANA



*.. An Eagle Washer Exceeds its
Rated Capacity by 20 Tons per
Hour at the Eagle Sand & Gravel Co.*

This Eagle Washer-Classifier-Dehydrator has given satisfactory and efficient performance day after day for over two years at the Eagle Sand and Gravel Co. plant near Sioux Falls, South Dakota. Handling at times up to 20 tons per hour over its rated capacity, the Eagle has given continuous performance with only a few minor maintenance repairs.

Designed by co-owners William G. and Robert F. Bruns—who also supervised construction—this complete washing and screening plant processes several grades of concrete material for general sale. A dredge moves the raw material to a screening tower located over eight aggregate bins designed for gravity loading of trucks. Two screens are used for grading—the fine material from the lower screen feeds to the Eagle for complete washing and dewatering. The washed material is fed to a manually controlled two-way chute feeding two bins. When one is filled the material is chuted to the other to allow continuous operation.

The Eagle Washer attacks the cleansing problem two ways to assure positive results: (1) the tumbling, squeezing action of the conveyor screw rubs grain against grain to loosen all foreign material; (2) a rising column of water the length of tub floats out all undesirable material. The Long Weir with adjustable lips, coupled with volume of water feed, provides exact wash water control for retention of fines to any classification. Send for Catalog 47.

Sand and Gravel Equipment

"SWINTEK" DREDGE LADDERS — SCREW WASHERS
LOG WASHERS — DEHYDRATORS — SAND TANKS
CLASSIFIERS — REVOLVING SCREENS

EAGLE IRON WORKS

137 Holcomb Ave. • Des Moines, Iowa

Conservation

(Continued from page 157)

sibility in helping to see that ag-stone is used where it will do the most good.

Liming Material Specifications

Research results from the Department of Agriculture and State experiment stations have made it possible for State Production and Marketing Administration Committees to establish minimum mechanical and chemical specifications for liming materials for which assistance is offered under the Agricultural Conservation Program. These specifications necessarily show a wide variation to meet the conditions of climate, soil and systems of farming in each state. Preceding is a table giving the minimum A.C.P. specifications currently prescribed for chemical and mechanical analysis in each state.

Conserving our soil resources, so that we can produce enough to eat for 148 million people now, and 160 or 170 million in 10 or 15 years, is a challenge to the farmers of this country, to the scientists who are making studies of soils and crops, to the agricultural limestone and fertilizer industry, and of course to the United States Department of Agriculture.

Agstone Institute

(Continued from page 117)

Soil Fertility as it affects Limestone Use," discussed ways to measure soil fertility and the part that soil acidity and liming play in soil fertility. His remarks were based on comparatively recent research. Clay and humus, he said, retain on their surfaces all the nutrients, and if not retained on their surfaces, the hydrogen ion (acid ion) will cover the surfaces. Acidity is a matter of how much acid and basic ions there are on these surfaces, and, he said, 80 percent of these surfaces must be covered with calcium, magnesium and potassium to have a sweet soil. Calcium, he emphasized, is a nutrient as well as a corrective for soil acidity.

Illinois, said Dr. Bray, used five million tons of agricultural limestone in 1948 but the requirement will be decreased to three million tons annually.

Sales Promotion

W. F. Sharpe, Dillon, Sharpe & Co., Columbus Junction, Iowa, gave some very practical merchandising suggestions in an inspiring talk on "Our Experience in Promoting Agricultural Limestone." He stressed that the industry has a great deal to sell but has been weak in sales effort. He cited how the industry in 1947 was threatened with going out of business when federal money was discontinued, to point out how weak the industry was in sales promotion. Competition,

he pointed out, is growing and the farmer must be convinced that agricultural lime will increase his crop yields.

Direct mail, year-end letters of thanks to customers, simple order cards in all letters, sales messages to go on all letter-heads and literature, the acknowledgment of all orders, newspaper advertising, speeches before schools and Farm Bureaus, the use of films, identification signs directing the way to plants, display booths at county fairs, all kinds of miscellaneous gifts such as key rings, pencils,



W. M. Carroll, left, and W. F. Childs III, Harry Campbell Sons' Corp., Towson, Md.

etc., radio advertising, signs on trucks and personal solicitations were suggested as merchandising tools that, accumulatively, will help do the job.

Resolutions

The following resolution was read by W. H. Margrab and unanimously approved:

"Whereas it is the opinion of almost all agronomists, soil scientists, and other authorities on the subject that the soils of this nation are being depleted at a dangerously rapid rate; and

"Whereas, substantial progress in checking this depletion is being made through the operation of the Agricultural Conservation Program, as a function of the Production and Marketing Administration, whereby far-

(Continued on page 160)



W. C. Thornhill, Texas Agricultural Limestone Association, Chapel Hill

REDUCE DOWNTIME

with YUBA DREDGE PARTS

Made for all dredges....long-wearing....built to fit exactly....quick delivery.



Yuba pioneered the use of alloy steels and heat-treating in the manufacture of dredge parts. You are sure of long-wearing, tough parts when you buy Yuba bucket pins, Abrasion Resisting and Manganese Steel screen plates, tumblers, ladder rollers, pumps, and other dredge parts. Yuba parts are carefully machined, enabling you to make field replacements quickly, and keep your shut-down time to the minimum.

Bucket Pins of all Sizes

Yuba makes bucket pins from the smallest to the largest diameters, and has supplied some customers with pins ever since 1912; thus attesting to the high quality and satisfaction our pins will give you.

A. R. S. Screen Plates

Yuba Abrasion Resisting Steel screen plates were developed especially for tough dredge service. Holes are taper drilled, uniformly spaced, to give you efficient and accurate screening. A. R. S. plates are stocked in all usual thicknesses from $\frac{1}{4}$ " up.



Yuba parts, such as bucket pins and A. R. S. screen plates shown here, increase average daily running time and profits.

Only OPERATING time is profitable time for you—so write, wire or cable your spare parts requirements NOW and have them on hand. We will send you prices and delivery information immediately. No obligation. Remember, we furnish parts for all bucket ladder dredges, whether Yuba design or not.

YUBA MANUFACTURING CO.

Room 717, 351 California St., San Francisco 4, California, U. S. A.
AGENTS: SHAW, DARBY & CO., LTD., SINGAPORE, KUALA LUMPUR, PENANG.
(SHAW, DARBY & CO., LTD., 14 & 19 LEADENHALL ST., LONDON, E.C. 3.)
CABLES: YUBAMAN, SAN FRANCISCO - SHAWDARBCO, LONDON

Dig Deep **FAST!** WITH AN OSGOOD



POWER SHOVELS • CRANES • DRAGLINES • CLAMSHELLS • BACKHOES • PILE DRIVERS

THE OSGOOD CO.  **THE GENERAL CO.**

MARION OHIO

DIESEL, GASOLINE OR ELECTRIC POWERED • $\frac{1}{2}$ TO $2\frac{1}{2}$ CU. YD. • CRAWLERS & MOBILCRANES

Pulverizers

Have you investigated our new

BRADLEY HERCULES MILL?

Unquestionably the last word in
Economy and Simplicity.

(Send for New Catalog No. 59)



BRADLEY PULVERIZER CO.
ALLENTOWN, PENNA.

Agstone Institute

(Continued from page 159)

mers are encouraged by incentive payments to perform important soil-conserving practices; and

"Whereas, after more than a decade of successful operation the Agricultural Conservation Program has amply proved its worth and is now well established and generally accepted as sound governmental procedure; and

"Whereas, by the wording of previous agricultural appropriation bills passed by Congress, also the budget message of the President submitted on January 10, 1949, funds appropriated for 'Conservation and Use of Agricultural Land Resources' must cover 'the cost of administering any acreage allotments or marketing quotas which may be adopted, as well as payments to farmers and related administrative expenses'; and

"Whereas, during 1949 and ensuing years, the sum of money that will be needed to administer acreage allotments and marketing quotas in connection with price support programs is certain to increase and thereby cause a reduction in the amount of money available for conservation incentive payments under the Agricultural Conservation Program, thus seriously retarding soil conservation activities; Now, therefore, be it

"RESOLVED, That we, the members of the Agricultural Limestone Institute, in convention assembled on the 22nd day of February 1949, in Chicago, Illinois, do respectfully request the Congress that the language of future bills appropriating money for 'Conservation and Use of Agricultural Land Resources' be amended so that any sum of money appropriated or authorized for the Agricultural Conservation Program be solely for that purpose and not subject to reduction by an amount needed to administer other farm programs unrelated to conservation."

Guest speaker at Tuesday's luncheon meeting was L. F. Livingston, Manager, Extension Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. "Research: a sound job of thinking," was the theme of Mr. Livingston's address which used as an example of business in these United States his own company, which was built almost wholly on research. He pointed out that 88 percent of all du Pont products are not marketed by the company, but reach the consumer only after some other manufacturer has fabricated the product, making it into the form of shower curtains, hair brushes, stockings or eye-glass frames. Mr. Livingston spoke from behind a 20-ft. table that was covered with samples of the raw product, as fabricated by E. I. du Pont de Nemours & Co., Ltd., and the finished product, as made by any number of small manufacturers.

In the concluding session, the color sound movie "On the Other Side of the

"Fence" was shown. This picture, produced by Phillips Petroleum Co., is concerned with the fact that farm animals know which grass is rich in needed minerals, and therefore they frequently eat the grass on "the other side of the fence." This picture is a perfect piece of promotion for the agricultural limestone producer to show at meetings and theaters in his locality. Henry Huschke said that the association had purchased five copies of this film and that they were available to members at a rental fee per week. Mr. Huschke continued by saying that the association had found that to produce its own film or films as was suggested at the convention a year ago would be too expensive an undertaking. He also briefly outlined other promotional pieces and activities sponsored by the association that are available to members.

Following showing of the movie, the final general session of the convention consisted of a floor discussion channeled toward a free and frank expression by members of association activities so as to aid the directors in planning future activities. The first suggestion from the floor was for a monthly house organ of the association that would serve as a medium for questions and answers by members on methods, ideas for merchandising, etc. W. D. Dillon, Dillon, Sharpe & Co., Columbus Junction, Iowa, spoke from the floor to emphasize that members should all "get out and talk up the association with neighbors in order to interest new members." Philip E. Heim, Carbon Limestone Co., Youngstown, Ohio, assured all present that as a member of the board of directors he would see to it that all suggestions would be considered by the governing body.

Dead-Burned Dolomite

(Continued from page 132)

point before it can be delivered to the storage bins.

A common plan is to have the cooler discharge onto a "grizzly." The oversize passes to a small crusher which, in turn, discharges into the boot of the elevator taking the undersize to the screens. Double-deck vibrating screens are used generally. The top size is that of the top size for the trade. Generally it is $\frac{3}{4}$ -in. or $\frac{1}{2}$ in. square. The bottom size usually is slotted screen (ton-cap) with 1/32-in. x 3-4 in. openings.

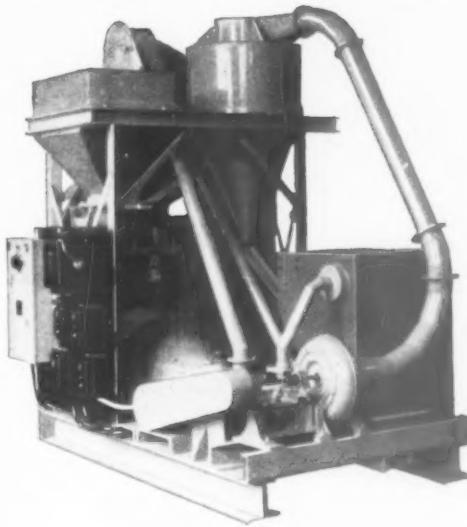
The dead-burned material that is oversize is returned to the small crusher. The two sizes of material through the screens are elevated to separate storage bins. Frequently, when there is no market for these fines, they are returned to the kiln feed for reprocessing during which they largely agglomerate and thus are recovered.

Although dead-burned dolomite is far more stable under atmospheric conditions than dolomitic lime, it is

(Continued on page 162)

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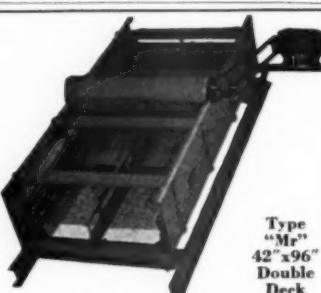
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not entirely stable. It gradually air-slakes unless provisions are made to limit the exposure. It will slake partially after a week or so in water. In moist air it might require a couple of weeks for it to start disintegrating. In an open but weatherproof shed it will commence dusting in several weeks. In a hermetically sealed vessel, it will retain its qualities for years.

In some plants the material is sprayed with a low-cost mineral oil as a preservative and anti-dusting treatment.

Since the demand on a dead-burned dolomite plant is largely established by the activity of the steel industry, and since a rotary kiln plant can be operated efficiently only when it is working at its full nominal capacity, there frequently are periods when the demand is far less than the capacity of the plant to produce. Again, within several weeks, the demand may far exceed the capacity of the plant. To provide for this emergency, it is well to give serious thought to the problem of dead-burned dolomite storage.

For short periods of storage, open bins are adequate. When material must be stored for periods greater than two or three weeks, it may be advisable to provide sealed storage bins or tanks. This has been done in the industry. Although the original cost may seem high, it has proved to be a very economical measure when everything is considered.

Plant Cost

The initial cost of a dead-burned dolomite plant will vary depending upon many factors. On an average, the kiln plant, with new purchased equipment, will cost from \$1000 to \$1500 per ton of daily production. The quarry, crushing, screening and storage facilities for a corresponding plant will require a similar investment. Thus the entire plant will involve an investment of between \$2000 and \$3000 per ton of daily capacity of dead-burned dolomite.

The use of second-hand, or used equipment, would enable the plant to be erected somewhat cheaper. This measure is not always satisfactory, however, since the various items seldom have the size or capacity required by good engineering practice, and improvisation doesn't always rectify this deficiency.

Manufacturing Costs

Fuel—The greatest single item of the manufacturing cost is fuel. A good grade of bituminous coal is used generally. Properly designed plants have operated with a fuel consumption of 400 lb. of coal per ton of dead-burned dolomite produced. With coal delivered to the plant at \$5.50 per ton, the fuel cost will be \$1.10 per ton of dead-burned dolomite produced.

Feed—The stone or feed cost to the kiln plant will not exceed 50¢ per ton with an efficient quarry and crushing plant operation. The recovery of this

material, however, is not 100 percent. In other words, the kiln plant must absorb the shrinking during the dead-burning operation. The recovery will be in the neighborhood of 55 percent. This will make the raw feed cost approximately 91c per ton of dead-burned dolomite produced.

Refractory kiln lining cost—There was a time when this cost item could be safely taken at \$1.00 per ton of product. Better lining materials, and closer control of the overall kiln operation can bring this figure to 25c per ton of dead-burned dolomite produced.

Power—The power cost item for a well engineered and properly maintained kiln plant probably will not exceed 20c per ton of product.

Maintenance and Supplies—This item of cost can be extremely variable, but 15c per ton of product should cover it.

Labor—Direct, 35c per ton; Indirect, 10c per ton.

Summing these cost items up, they amount to \$3.06. No doubt some members of the industry have manufacturing costs greatly in excess of this figure, while some will be less. But on the average, this will be a fair manufacturing cost. Of course the total cost must include the overhead, administrative and sales expenses. Accordinging these items the equivalent of 150 percent of manufacturing cost, or \$4.59 per ton, the total cost will be \$7.65 per ton of dead-burned dolomite.

The sale of the by-product "fines" can be considered an extra dividend on the investment.

Five-Fold Expansion

(Continued from page 113)

Limestone for the new plant is secured from a deposit 17 miles from the plant. At that location a dome-like structure of horizontally stratified high calcium limestone is quarried. The deposit has no overburden on it and covers about 50 acres of ground. At the time of inspection, a top slice of about 30 ft. was being taken and delivered to the crushing plant. The raw material is a rather soft and friable stone resembling somewhat the caliche of the Southwest, and assays better than 98 percent calcium carbonate with about 1 percent MgCO₃. The phosphorous content is said to be low.

Trucks deliver the material a short distance to a steel hopper under which is a roll-type Pioneer grizzly set to 3-in. opening. This acts as both a grizzly and a feeder for the 36- 42-in. Pioneer jaw crusher. The feeder is driven off the crusher, and the crusher is "V" belted to a D 13000 Caterpillar diesel mounted below the structure holding the crusher and feeder assemblies. The Caterpillar diesel also is connected to a motor-generator set that supplies electric power to run the stockpiling conveyors. The jaw crush-

(Continued on page 164)

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Macwhyte Wire Rope

Five-Fold Expansion

(Continued from page 163)

er (set to 6-in.) discharges to an inclined belt serving a shuttle conveyor located on the steel structure over the ground storage pile. A reclaiming tunnel and conveyor belt is used to load trucks. Five gravity type gates feed this belt. Electric power for the reclaiming belt conveyor is obtained from local sources which enables trucks to be loaded without running the diesel.

Minus 3-in. rock is trucked to the plant over paved roads of level or downhill grade. At the plant the rock is dumped to a steel hopper under which is a model 1947, Pioneer, reciprocating pan feeder that delivers to a set of 16- x 30-in. Pioneer double roll crushers. The rolls are set to 1½-in. and the products fall to a 16-in. Goodrich inclined belt which elevates the crushed product to a model 1947, 4- x 10-ft. 2-deck Pioneer dry vibrating screen mounted on a concrete and steel structure over the ground storage facilities. The top deck of the screen has 1½-in. mesh and the lower deck 3/16-in. mesh. Oversize from the top deck is chuted to a steel bin below and the rock returned by trucks to the feeder at the rolls for re-crushing. The minus 3/16-in. material falls to ground storage. Plus 3/16-in. material from the screen falls to a short inclined belt conveyor that delivers to a second sizing screen over the storage pile. This is a Model 1947 Pioneer 2-deck, 3- x 10-ft. dry screen. It has a 1-in. and a ¾-in. mesh top and lower deck, respectively. The larger size falls to a relatively long belt conveyor that dumps to the end compartment of the storage area; the plus ¾-in. from the lower deck goes to a shorter horizontal belt that discharges to ground storage.

Controls for the stockpiling conveyors and related equipment use Westinghouse push buttons with Bulldog "Clampmatic" contact switches. They are mounted in a glass-enclosed house at the end of the conveyor gallery.

Ground storage facilities consist of four pockets each designed to hold 1000 tons with each pile separated by a concrete dividing wall of ample proportions. The floor is also concrete. Under the piles is a reclaiming tunnel with eight gravity-type gates that feed a reclaiming belt. The reclaiming belt delivers to the long inclined belt and thence to a shuttle conveyor that can load the kiln feed bins, or discharge to the steel hopper ahead of the grinding equipment in the limestone preparation section.

The plant was constructed by All-hands and Swatzell, general contractors of Cleburne, with Ray Steelhammer in charge of the construction. It was designed by the L.I.M.E., Hershey, Penn., who also had general supervision of the construction. John Carlisle is plant foreman.

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Rock Wool

(Continued from page 145)

would do is increase the temperature in other sections of the bed where coke would become active as a reducing agent of CO₂ and thus dissipate itself.

As matters stand in the case of cupolas, all we need is a very high temperature at the hearth and slightly above it. The sensible heat remaining from this would be ample to preheat the downward moving charge, and is sufficient even though a large amount of this heat was abstracted in the formation of CO. So, certainly, we are not interested in any secondary burning of CO. It would not help, but would only make cupolas inoperative.

For kiln practice, coke size should be regulated so that it will burn early; for cupolas, it should burn late, in fact, as an ideal, it would be best if it would not burn at all until it reaches the oxidizing zone and thus completely eliminate the reducing zone.

In general, a cupola requires a coke that will burn rapidly at the tuyeres, but have a sufficiently strong structure and hard surface to resist abrasion and solution by the CO₂ in the upper parts of the cupola. Gradation also is important, as small coke may never reach the hearth where it is needed.

However, the above suggestion in no manner solves the problem; it will just reduce slightly the great loss of 40 or 50 percent of the coke. Still there seems to be a solution, a rather unusual one, in special pre-treatment of coke.

The idea may seem to be far fetched but it may be a good idea. On delivery, before coke is stored, it should pass through a short rotary mixer wherein its surface would be covered with some sort of quickly hardening cement mixture of low melting point. Such coke would then pass through all the upper stages without reacting with CO₂, but in the lower hotter section, the surface film would melt off and the coke would be presented intact to the oxygen at the most desirable level.

Cupolas could not be started with such coke, but after the melting temperature was once attained, it could serve quite well.

This seems the only complete solution to the problem of coke conservation, excepting that of utilizing the CO generated for purposes of pre-heating the air, and thus return the wasted heat to the hot zone in this more circuitous manner.

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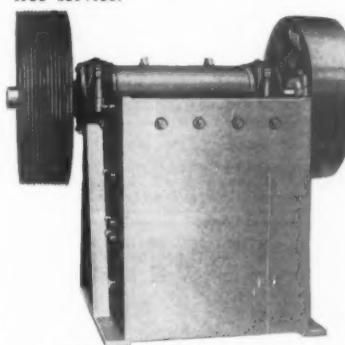
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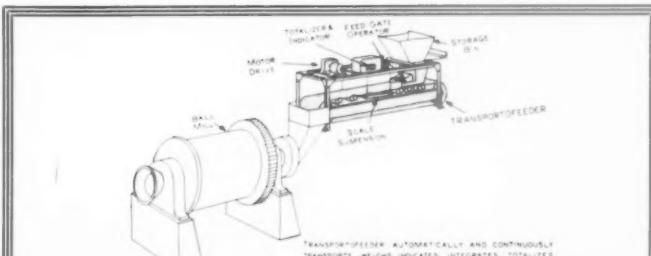
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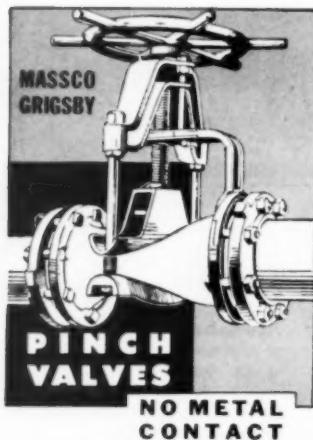
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Lime

(Continued from page 125)

sion. There is no stone charged smaller in minimum dimension than $1\frac{1}{4}$ in. There are a few odd pieces larger than 4-in. minimum dimension, but not many.

Such stone, tending to oblong shape, leads, through bridging, to looser packing and greater voids than normally is obtained from more equal-dimensioned breaking stone. The 4-in. minimum dimension in the maximum size pieces is also important as it is upon this that the time of calcination depends. If this minimum dimension of the main run of the largest pieces of stone should be five rather than four inches, then the required time of calcination—everything else being equal—would be increased by that amount, or 25 percent. Occasionally one encounters stone that runs 6-in. minimum dimension.

Gas flow through beds of broken solids depends on the size of the voids, percentage of voids, distribution of voids and openness of the channels between the voids. This in turn de-

pends on the size of the general run of solids, their shape, size range of the components of the bed, percentage of various component sizes and the packing of the bed.

In a bed of very close-range sized broken stone, there will be about as many voids as there will be pieces of stone. The voids will constitute approximately 47 percent of the volume if the bed is loose or about 42 percent when packed. Admixtures of smaller or larger sizes will tend to reduce the voids. Reduction however will be small, on the order of a percent or two if the small size is not more than 40 percent smaller than the large. That is the case at Houston where the general run of the large stone is 4×8 in. Admixtures of the $1\frac{1}{2} \times 3$ in. stone are permissible, but anything smaller would tend to rapidly close in on the voids. The smaller the minimum size, the greater will be the effect and the initial amounts will do more harm proportionately than additional increased amounts.

When small-sized stone is interposed between the large pieces of a general run of 40 percent or more in

	Size	Penetration In.	Surface Sq. In.	Weight Lb.	Surface Weight
Most Harmful Large	5x10	2.5	150	22.5	6.7
Undesirable Large	4x8	2.25	115	18	8.3
Large	4x8x10	2	90	11.5	8.3
Medium	3x6 to 7	1.5	54	4.8	11.2
Small	1 $\frac{1}{2}$ x3	1.25	13	.7	18.5
Undesirable Small	5 $\frac{1}{2}$ x1 $\frac{1}{2}$.37	3.3	.1	33.0
Most Harmful Small	Minus $\frac{1}{4}$				

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comparative size, it will keep the individual large pieces of stone apart and the voids relatively open. However, when smaller, the tendency is to close in and, when still smaller, it will tend to clog at the inter-connecting constrictions between the larger voids. This is when the most harm is done and only 5 percent will seriously affect operations.

The openness of channels between the voids is probably the most important consideration and since they are constricted, they are closed by the finest of the small sizes. An amount which may not greatly reduce the voids may double the resistance by settling across the up-flow streams, acting as a partially closed damper.

The above tabulation presents the likely size ranges that would be obtained from Austin type stone at a definite crusher setting, and classified as to their desirability.

Calcining penetration, which is half the minimum dimension, is of course greatest in the largest stone. Coupled with this is the lower heat absorbing surface for a given weight of stone embraced. Therefore, this size is objectionable on the basis of much longer time required to complete calcination.

The smaller sizes are objectionable on the basis of blocking of vertical gas paths and interference with lateral gas distribution. The smallest considered admissible weigh only one-sixteenth that of the larger. The core

would be increased by both, due in one case to interference with distribution and in the other to required longer calcination time. Occasionally there is a combination in which the fines envelope the large pieces, with the result that the latter comes out of the kiln half burned.

The more symmetrical the stone, the greater will be the uniformity in its piling, resulting in lower voids and much greater resistance to gas flow, thus making screening more important. Stone tending to cubical breakage should be more closely sized than Austin which is of oblong and slabby tendency. This shape factor is an important consideration. A sphere would be the least desirable, having the greatest required penetration and the least surface for amount of weight embraced.

Entirely uniform stone is not so desirable, for the reason that a slight reduction in voids, brought about by an amount of smaller component, contributes to a higher heat transfer, through creation of a more tortuous flow of the gases, smaller passages and more intimate scrubbing contact between the flowing gas and the solid. From this standpoint, to calcine the 4- x 8-in. stone admixed with 2- x 4-in. stone, would be definitely better even though the resistance to gas flow would be somewhat increased.

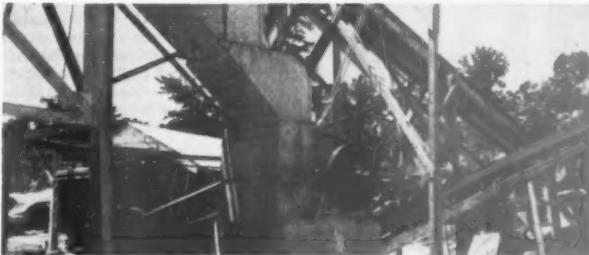
In fact we want resistance, as it is a necessary contact and high heat transfer, but it must not be an unduly interfering resistance caused by plugging of channels. Resistance to flow varies with the size of the voids which depend on the size of material and its packed state. If they are normal in both cases, then for half-sized material, voids will be half-sized and the resistance double. In such a case the kiln height should be about half as much, bringing the draft loss again to unity. Resistance varies also with the amount of voids, quadrupling if the void space is reduced to half or doubling if the voids are reduced but 30 percent.

This latter condition, however, may be far worse. It all depends on the size of the void-cluttering material. It is even possible, and quite readily so, for but a 5 percent reduction in voids to result in double the flow resistance. For one reason or another, it is quite possible for combined resistance under one set of conditions to be eight times as great as under another.

Fortunately when the material passes down through the kiln there is a rearrangement during each movement, and partially-blocked spaces may become opened. But this is only fully possible when the charging of the sizes is uniform over the cross-section of the shaft with little segregation or local concentrations. But, allow the fines to fall to the center, for example, and they will remain in the center all through the kiln. Allow the large pieces to roll to the sides and they will remain there all through the

(Continued on page 169)

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FOR Positive Controlled
Feed by Weight of Sand,
Gravel, Lime Clinker,
Gypsum or other materials
to Process—

Use the Feedoweight

Merrick Scale Mfg. Co.
Passaic, New Jersey

Pennsylvania Agstone

(Continued from page 154)

as an incident to or in conjunction with a farmer's own farming operations.

"In connection with exemptions, here's one basic principle to remember: If an employee performs any nonexempt work in the same workweek in which he performs exempt work, he will not be within the exemption for that entire workweek.

"Now let's consider how this works out. If employees of a lime manufacturer haul and spread limestone on a farm which produces goods for interstate commerce, the employees would be subject to the provisions of the Act. The hauling activities would not qualify for the exemption which applies to employees employed in agriculture. But the spreading operations would be considered exempt. However, if both the hauling and spreading are performed in the same workweek, the employees would not be exempt at all and would be entitled to the minimum wage and overtime benefits of the Wage and Hour Law.

"But if a farmer hauls and spreads your limestone on his own farm for himself, his activities would come within the minimum wage and overtime exemption I've referred to.

"Next we have to consider the case of the farmer who hauls and spreads limestone for his neighbors. The question here arises whether the farmer is an employee of the limestone-producing company or if he has made an arrangement with his neighbor for his compensation, if any. If the farmer is an employee of the limestone-producing company, then the obligations of the company to pay his minimum wages and overtime compensation in accordance with the Wage and Hour Law concerning his pay.

"Now let's take the case in which the limestone producer employs truck owner-operators. Here, too, the question arises as to whether the trucker is in fact an independent contractor or an employee of the lime-producing company. If the trucker is in fact an employee of the lime company, the company would be liable for payment, in accordance with the Wage and Hour Law's provisions, to employees who perform the work, just the same as if the work had been done by the company's own employees.

"That is to say, the hauling and spreading activities would be subject to provisions of the Wage and Hour Law if the limestone was hauled across State lines or was used by the farmer to produce goods for interstate commerce. And the spreading activities would be within the minimum wage and overtime exemption, but the hauling activities would not. And furthermore, as I've already pointed out, employees would not be entitled to the exemption if they performed both hauling and spreading during the same workweek.

"Of course, if the trucker is in fact an independent contractor, the producing company would not be liable for the wage payments to the trucking employees."

Officers and Directors

During the business meeting, which was called to order immediately after lunch, the following officers and directors were elected for the year 1949: chairman, F. Edward George, Thomasville Stone & Lime Co., Thomasville, Penn.; vice-chairman, Leonard S. Fry, Fry Coal & Stone Co., Mercersburg, Penn.; treasurer, H. M. Binkley, Binkley Bros. & Ober, East Petersburg, Penn.; and secretary, H. H. Wagner, Agricultural Limestone Division, Harrisburg, Penn.

Elected to serve as the board of directors were: in the eastern section of Pennsylvania, D. K. Shroyer, H. E. Millard Lime & Stone Co., Annville, and Fred E. Roberts, Evans Roberts, Norristown; in the central section, R. B. Garman, Tyrone Lime & Stone Co., Tyrone, and C. Roy Binkley, Binkley Bros. & Ober, Dry Run; and in the western section, P. E. Heim, Carbon Limestone Co., Youngstown, Ohio, and H. W. Lamb, Grove City Limestone Co., Branchton, Penn.

The following members were appointed to the program committee: P. E. Heim, Youngstown, Ohio, chairman; F. E. Wholaver, Whiterock Quarries, Inc., Bellefonte, Penn.; Paul I. Detwiler, New Enterprise Stone & Lime Co., New Enterprise, Penn.; and K. O. Brown, New Castle Lime & Stone Co., New Castle, Penn. The new committee gave the full approval to the advertising of Agricultural Liming Materials which is being carried on through a local publication.

Crushed Stone Ass'n. Host to Highway Officials

NATIONAL CRUSHED STONE ASSOCIATION, Washington, D. C., recently was host to approximately 40 Central Atlantic States highway officials, American Association of State Highway Officials, and representatives from the Public Roads Administration and National Highway Research Board. The highway men visited the new National Crushed Stone Association headquarters and research laboratories. Engineering Director Goldbeck, N.C.S.A., outlined projects now being conducted in the research laboratory, after which refreshments were served.

Pavement Yardage

AWARDS of concrete pavement for the month of February and for the first two months of 1949 have been announced by the Portland Cement Association as follows:

	Square Yards Awarded During Feb., 1949	During First Two Months, 1949
Roads	601,481	2,337,802
Streets and Alleys	513,692	1,296,678
Airports	36,895	77,426
Total	1,151,468	3,711,906

Lime

(Continued from page 167)

charge. The result can well be imagined since the gas will take the path of least resistance. It is not only sizing of stone that is important but it is also important to have a proper kiln top and kiln car design which will avoid segregation to the greatest extent possible.

In closing we may say that for the best results, having more than just good stone sizing, well charged, is necessary. There is the kiln which needs to be properly proportioned in its various zones and be workable. In addition, an adequate amount of combustible must be supplied at suitable velocity for proper penetration and distribution of heat. Beyond this, control through hot zone recirculation is also demanded so as to further aid heat distribution and to control the otherwise likely too high temperatures, lime sintering and kiln spalling.

It is only through the combination of good well-sized stone, of proper center and side burners, having correct port sizes and the setup supplemented by a good exhaust and recirculating system that the most production can be obtained from a vertical lime kiln at lowest cost.

It may further be said that as we study the lime kilns over the world, there were never any kilns approaching or exceeding a capacity of one ton per sq. ft. of shaft area unless they were Azbe type kilns, except for mixed feed kilns. Further refinements in kiln design principles combined with suitably sized and charged stone as covered by this paper, will make even higher capacities possible and brings the two ton goal into sight.

Complex Gas Analysis

METHODS for utilizing analyses of complex gas mixtures as a basis for establishing safe procedures for preventing gaseous explosions and in controlling and extinguishing fires in mines, tunnels, and industrial plants are described in a bulletin released by the Bureau of Mines, entitled "Analyses of Complex Mixtures of Gases," Bulletin 471. From mathe-

matical computation or from graphs, it is possible to establish readily if the mixture is explosive; if the mixture is capable of becoming explosive when admixed with air; and how the mixture can be made non-explosive. Formulas and graphs are included in the report. Copies may be obtained at a cost of 75c from the U. S. Government Printing Office, Washington 25, D. C.

German Dolomite

(Continued from page 132)

As the complete production of the plant could not be completely utilized after the war and, since the burning of ordinary dolomitic lime is not very economical, it was decided to produce a half-burned dolomite; that is, by careful control of the temperature only the carbon dioxide was driven from the magnesium carbonate while the lime carbonate remained unchanged. This product is used for different purposes and is a good quality and profitable product. In certain sizes it is especially valuable for water softening and when ground is used in the production of magnesite floors, magnesite cast stones, or fiber slabs. The dust forms a valuable substitute for caustic burned magnesite.

The uniform and hard burned rotary kiln dolomite calcined at a high temperature serves as a stabilized dolomitic stone for the steel industry. Such stone has the ability to stand temperature shock better than magnesite.

Magnesite formations are found in many parts of the world yet the economically useful magnesites of suitable composition are only found in a few places and are scarce. In many lands having no usable magnesite deposits, producers have tried for a long time to make a dolomite product suitable for refractories in place of magnesite.

The dolomite industry is provided with a new opportunity to serve the steel industry with sintered dolomite, and also for cement and other industries requiring high temperature refractories. There is also a market for partly sintered dolomite for building materials, cast stone, and water treatment.

"HERCULES"
the DEPENDABLE
WIRE ROPE
for ~~any~~ TOUGH JOB



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A. LESCHEN & SONS ROPE CO.
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New York • Chicago • Denver
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ONE 18" x 36" TYPE B
BIRDSBORO BUCHANAN
JAW CRUSHER

IMMEDIATE
DELIVERY

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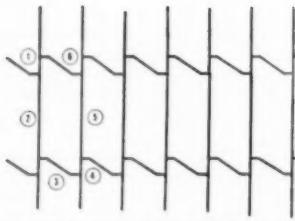
STEEL FOUNDRY & MACHINE CO.
BIRDSBORO, PA.

LONGER PRODUCING LIFE BUILT INTO FARREL-BACON CRUSHERS

Permanent strength and operating efficiency is engineered into these crushers at every vital point. Farrel-Bacon will provide industrial units or completely designed and equipped plants, including screens, elevators and conveyors. Also other types of mine, quarry, sand and gravel plant machinery. Write for complete information.

FARREL-BACON
ANSONIA, CONNECTICUT





7 STAVES INTERLOCK



Each Super-Concrete Stave in a Neff & Fry Silo interlocks with six contiguous ones. The edges are grooved and headed. The joints are so secure that grouting is not necessary, although a mastic filler is used when damp-proofing is specified.

Due to the diagonal joints, reinforcing rods impinge upon both ends of all staves. As many additional rods are drawn around the bodies of the staves as needed to resist lateral pressure.

This patented design makes the N & F Silo a structure of distinctive strength and solidity. The corrosion-resistant materials assure long life with virtually no maintenance cost.

It will pay you to get complete information. Write, wire, or phone.

THE NEFF & FRY CO., Camden, O.

SUPER-CONCRETE STAVE BINS

For All Sorts of Flowable Bulk Materials

industrial OIL AND GAS BURNING EQUIPMENT

- Mechanical Atomizing Oil Burners
- Steam Atomizing Oil Burners
- Refractory Burner and Muffle Blocks
- Industrial Gas Burners
- Low Air Pressure Oil Burners
- Fuel Oil Pump Sets
- Valves, Strainers, Furnace Windows
- Tandem Block Combustion Units
- Combination Gas and Oil Burners

Detailed information gladly sent you upon request.



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NATIONAL
BURNER COMPANY INC.

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TEXAS OFFICE 2513 SOUTH BROADWAY HOUSTON 4

Manufacturers' News

The Timken Roller Bearing Co., Canton, Ohio, has announced the appointment of Seward T. Salvage as sales promotion manager, with headquarters in Canton. He was formerly assistant district manager of industrial bearing sales in the Cleveland office. T. F. Rose, Cincinnati branch manager, has been named manager of Timken Roller Bearing Service and Sales Limited, Toronto, Ont., succeeding C. E. Webster, who died recently. H. C. Telford, assistant manager of the Atlanta branch, succeeds Mr. Rose as manager in Cincinnati.

Prima Products and the Lithogen Corp., New York, N. Y., have announced the election of Richard M.

Scanlon as vice-president in charge of sales. He was formerly with the Stores Merchandising Division of Devoe & Reynolds Co., Inc. Before that, he was sales and advertising manager for Steam-O-Matic irons and for Prima Products' Aquella. The Lithogen Corp. is a new company, formed to manufacture and market a new kind of protective coating that is said to have six times more wear resistance than paint.

R. G. LeTourneau, Inc., Peoria, Ill., demonstrated the roadability of the 20,700-lb. Tournapull-Scraper by driving it from Laredo, Texas, to the company's Mexico distributor, Construcción y Maquinaria, S.A., Mexico City, Mexico, a distance of 763 miles, in 46 hours. Dover Fouts, export sales engineer, was met at the U. S. border (Laredo, Texas), by the distributor's representative and accompanied him to Mexico City.

Marlow Pumps, Ridgewood, N. J., announces that Andre S. Rubin, Jr., has been appointed sales manager. Mr. Rubin has been associated with the company since 1942 when he became assistant to the late A. S. Marlow, Sr., founder of the organization. He has been active in the development of self-priming centrifugal pumps for construction, and is widely known in the construction industry. Mr. Rubin was graduated from Rensselaer Polytechnic Institute in 1934 and until 1942 was connected with the marketing division of the Continental Oil Co.

The Tractomotive Corp., formerly of Findlay, Ohio, has moved to its new plant at Deerfield, Ill., 40 miles north of Chicago, according to V. M. Dobeus, president. Tractomotive manufactures front-end shovels and loaders for Allis-Chalmers crawler and wheel-type tractors in addition to other road building equipment.

The Multiplex Concrete Machinery Co., Elmore, Ohio, has named Lawrence J. Holzman as president and general manager of the company.

He was formerly vice-president of Parsons Engineering Corp., Cleveland, Ohio, and is widely known in the foundry and aggregate fields. He has designed many of the dust control systems

now used in these industries. Frank Muenzer, who has been with the company for several years, will serve as vice-president in charge of research and development.



Earthmover arrives at destination, Mexico City, Mexico, from Laredo, Texas, making 763-mile trip in 46 hours



Andre S. Rubin, Jr.

*For Economical
Material Handling*
**JONES SKIP HOIST
DRIVES**

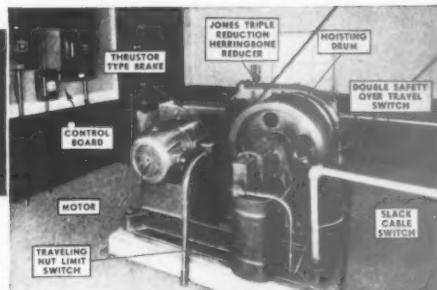
FOR speedy operation, reliable service and over-all economy the Jones Skip Hoist Drive has made a name for itself in a wide variety of material handling service. These skip hoist drives are built as complete units by the Jones organization in several types with base to take any motor specified by the purchaser. They are equipped for all the modern protective devices such as cam or nut type limit switches, solenoid or disc type brakes and slack cable switches. The drives are single, double, or triple reduction Jones Herringbone Speed Reducers, built to stand up under the many years of pounding that a skip hoist drive has to take. The shafts are supported in roller bearings, with rolling action, rack generated gear and pinion teeth to insure easiest possible starting with low starting peak loads. All reducer bearings and gears are automatic oil-bath lubricated.

The Jones organization has an extensive file of information on skip hoist drive problems and will be pleased to work with you on any problems involving such applications.

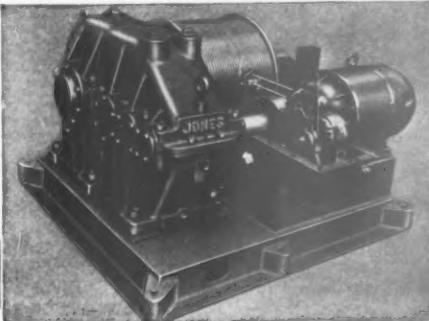
W. A. JONES FOUNDRY & MACHINE CO.
4447 Roosevelt Road, Chicago, Illinois

Jones

HERRINGBONE • WORM • SPUR • GEAR SPEED REDUCERS
CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES
ANTI-FRICTION PELLON • BEARINGS • PULLEYS
FRiction CLUTCHES • TRANSMISSION APPLIANCES



The view above shows a typical Jones Skip Hoist Drive installation while the view below shows one of the Jones units equipped with traveling nut type limit switch, motor actuated brake, and slack cable switch.



**SMALL JOBS can now be
BIG PROFIT operations**

Interchangeable
booms and buckets



THE $\frac{1}{3}$ -YARD SCHIELD BANTAM
TRUCK MOUNTED POWER SHOVEL • TRENCH HOE
DRAG LINE • CLAM • PILE DRIVER • CRANE

Here's versatility, here's mobility, here's profit-making capacity all wrapped up in one machine. The BANTAM mounts on any 1½-ton truck chassis or larger. Drives up and digs in. Finishes one job and speeds on to the next. No lost time to cut into profits.

As a shovel or drag line the BANTAM has a capacity of 60 yards per hour. When used as a trench hoe it will dig 100 feet of five-foot ditch per hour under normal conditions.

A money-maker in digging water and sewage systems, drainage ditches, basements, loading sand and gravel, tiling, and handling construction materials.

Check and compare BANTAM features before you buy. Write for complete details.

THE SCHIELD BANTAM CO., Inc.
216 Park Street, Waverly, Iowa

ECONOMICAL



HAMMOND MULTI-WALL BAGS

... for every purpose

The economy feature of Hammond Multi-Wall Bags is one of the most outstanding reasons for their widespread popularity. The first cost is the only cost. No handling, cleaning, storage or freight charges on "returned containers"—no "returned bag" nuisance.

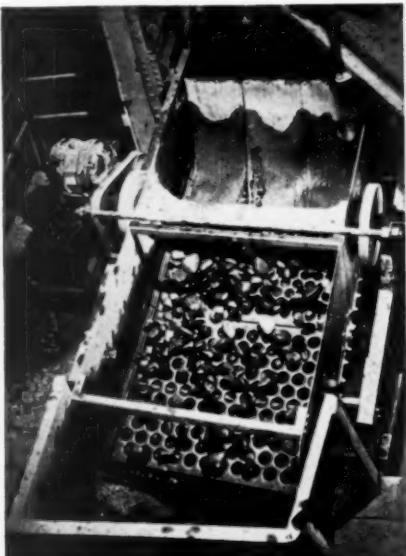
SEWN • PASTED • OPEN MOUTH OR VALVE STYLE

HAMMOND BAG & PAPER CO.

PAPER MILL AND BAG FACTORY

WELLSBURG, W. VA.

The mesh stays uniform however rough the usage



An outstanding advantage of Hendrick Perforated Plate for vibrating and shaking screens is that it maintains uniformity of mesh throughout an unusually long service life.

Other advantages are its full clearance that obviates clogging, and the ease with which decks can be changed, minimizing labor costs. For screening highly abrasive material Hendrick Perforated Plate is heat-treated to increase its toughness.

With any desired shape and size of perforations, Hendrick Perforated Plate can be supplied—either flat or corrugated—in any required gauge in tank, high carbon, high tensile, and abrasive-resisting steels, and in other commercially rolled metals. Write for detailed information.



Perforated Metals
Perforated Metal Screens
Architectural Grilles
Mitco Open Steel Flooring,
"Shur-Site" Treads and
Armorgrids

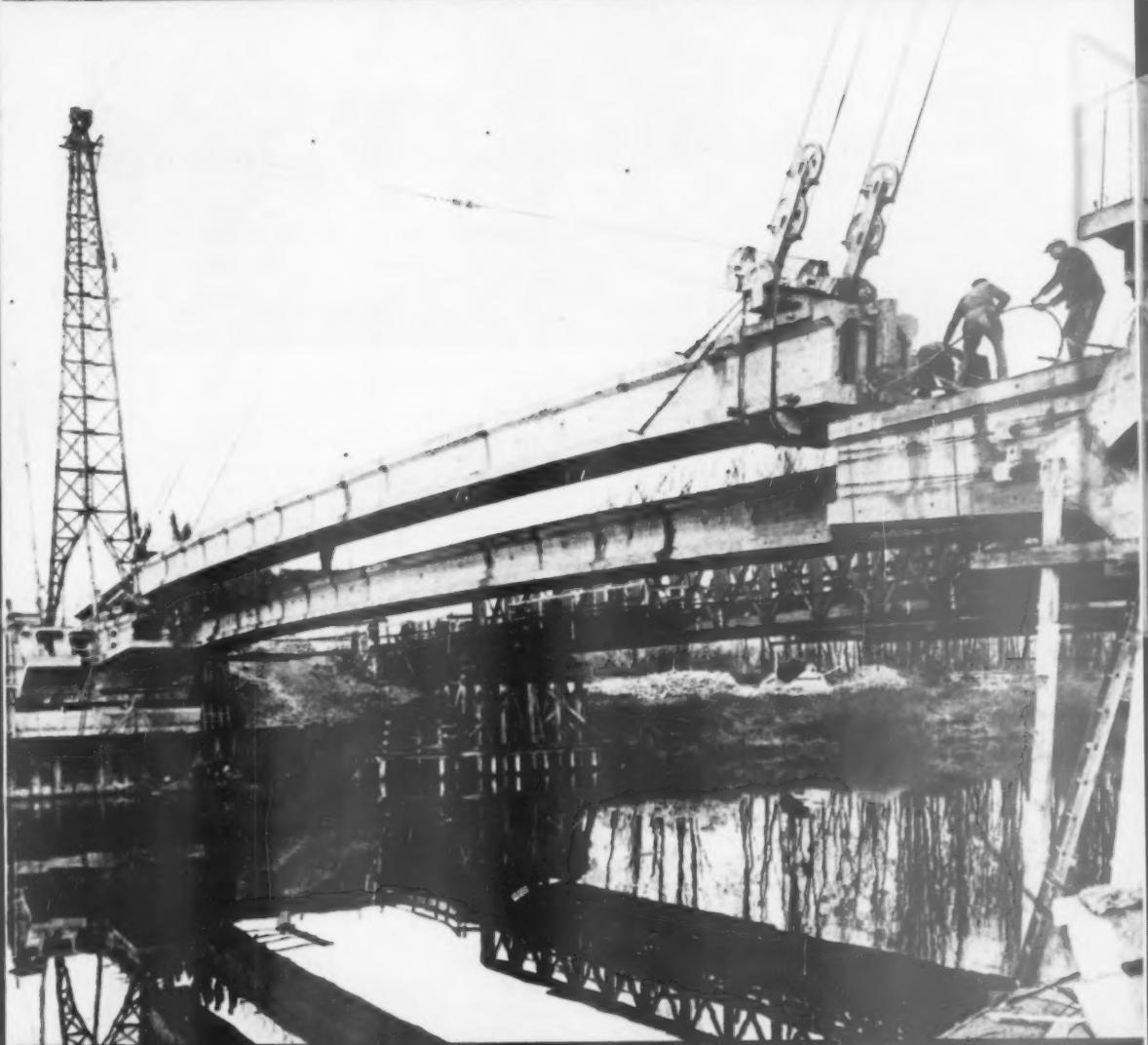
HENDRICK
Manufacturing Company

47 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities

CONCRETE PRODUCTS

CONCRETE UNITS . READY-MIXED CONCRETE



Published
by the

A SECTION OF
ROCK PRODUCTS

"THEY CHARGE WELL, MIX THOROUGHLY, DISCHARGE QUICKLY AND COMPLETELY."

LUDWIG F. KAHL



Read what the owner of this

fleet has to say

When a big-time ready-mix producer starts talking facts about equipment in which he has invested heavily — it's time to listen! For example, Mr. Ludwig F. Kahle, owner of the Pine Hill Concrete Mix, is well qualified to pass judgement on Blue Brute Hi-Up Truck Mixers. He purchased his first Hi-Up three years ago, and on the basis of this machine's performance has since expanded his fleet to twelve. Mr. Kahle writes:

"Our Hi-Up fleet has operated very satisfactorily. These mixers charge well, mix thoroughly and discharge quickly and completely. Other than ordinary wear we have had little mechanical trouble."

That's the performance story you hear over and over from Hi-Up owners. For the reasons why, just look over

these outstanding Hi-Up features: Improved, non-jamming sealing door . . . trouble-free water system . . . clean simplicity of design, with easy accessibility . . . engineered flexibility that absorbs working strains . . . fast-charging hopper . . . and Ransome's exclusive blade action, unbeatable for thorough mixing and fast discharge — even at minimum slump!

Why not investigate thoroughly how Ransome Blue Brute Hi-Ups can save you time and money on every job — day after day, year after year? For further proof that *there's more worth in a Blue Brute*, see your nearby Worthington-Ransome Distributor, or write for Bulletin 221.

R9-2

Massed Efficiency-Plus-Economy!
The hard-working Ransome Blue
Brute Hi-Up Truck Fleet of the
Pine Hill Concrete Mix, outside
the Company's plant in Buffalo,
N. Y. Hi-Ups purchased through
Murray Equipment Co., Buffalo.

WORTHINGTON



WORTHINGTON PUMP AND MACHINERY CORPORATION
Construction Equipment Department, Harrison, New Jersey
Distributors in all principal cities

BUY BLUE BRUTES



IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB.

INDUSTRY NEWS

Remodel Concrete Mixer Boat for Dam Work

DRAVO CORP., Pittsburgh, Penn., has started remodeling work on a concrete mixer boat to be used by the corporation's Contracting Division in the construction of a new lock and dam for the Corps of Engineers, U. S. Army, on the Monogahela River, Morgantown, W. Va. The hull of the vessel is being lengthened 10 ft., and two tilting-type concrete mixers and accessories are being installed. Capacity of the floating plant will be about 80 cu. yd. of concrete per hr. and four different mixes can be prepared on the boat. Sand, gravel and cement are loaded into the batchers on the boat with a whirley crane. Cranes also are being used to lift buckets of concrete from the boat to small rail cars for transportation to the pouring location at the dam.

Foam Concrete Filler Blocks

PORETE MFG. CO., North Arlington, N. J., has announced development of Poretherm concrete for floor and roof construction. The material is a cellular concrete weighing 30 lb. per cu. ft., and is made of portland cement without any other aggregate except ½ percent of wood fiber and the necessary foam. The concrete is mixed in a foam machine with a capacity of 20 cu. yd. of foam per hr., and has the consistency of heavy cream when wet. Poretherm filler blocks for floor and roof construction are poured on the job, using the same hoisting and placing equipment required for the struc-

tural concrete, and eliminate the need for prefabricated filler units or metal domes, according to E. Walter, president. The filler blocks are said to provide insulation against sound and heat, and are fireproof.

Granted Block Contract

BUILDERS SUPPLY CORP., Phoenix, Ariz., has been granted a contract to supply pumice block for the new Atomic Energy Commission plant to be constructed this year on the Salton Sea, Calif. The Builders Supply Corp. plant, representing an investment of approximately \$500,000, has 13 curing kilns, and can turn out 75,000 block per day. The firm is planning to duplicate this plant with a plant in the Imperial valley, and as a step in that direction, already has acquired mine and plant properties there.

Lightweight Aggregate

MARIETTA CONCRETE CORP. is planning construction of a \$250,000 plant at Marietta, W. Va., for the production of "aglite," a lightweight material for concrete block and staves. Capacity will be 20-30 carloads per day. A hollow concrete "aglite" stave also will be manufactured. F. L. Christy is president of the firm.

Distributes Celocrete

THE CELOTEX CORP., Chicago, Ill., has announced that the Lone Star Steel Co., Lone Star, Tex., has been granted a franchise to distribute and produce Celocrete lightweight concrete aggregate.

Effect of Earthquake on Concrete Masonry

THE CONCRETE MASONRY MANUFACTURERS ASSOCIATION, Los Angeles, Calif., recently sponsored an inspection of damage resulting from an earthquake which centered at Hot Springs and Thousand Palms, Calif. The earthquake was rated as a strong VII or light VIII on the Mercalli Intensity Scale, comparing with the Long Beach earthquake of 1933, rated VIII on the scale. Total destruction of buildings on the same scale was rated as XII.

An inspection of the concrete masonry buildings built in the area revealed that they had withstood the earthquake, even though a large percentage of them were very poorly constructed. Cracks were observed to have opened a few places where walls had no bond between each other. Mortarless masonry buildings also had withstood the earthquake well. The several adobe buildings observed, showed considerable damage, however.

POPLAR BLUFF BLOCK CO. has been opened at Poplar Bluff, Mo., for the production of concrete block. Capacity is 1500 units per day. J. E. Snipes is proprietor and manager.

CONCRETE PRODUCTS, INC., has leased a tract of land at Flat River, Mo., where it is erecting a building for the production of ready-mixed concrete. Plans also call for the manufacture of concrete pipe.

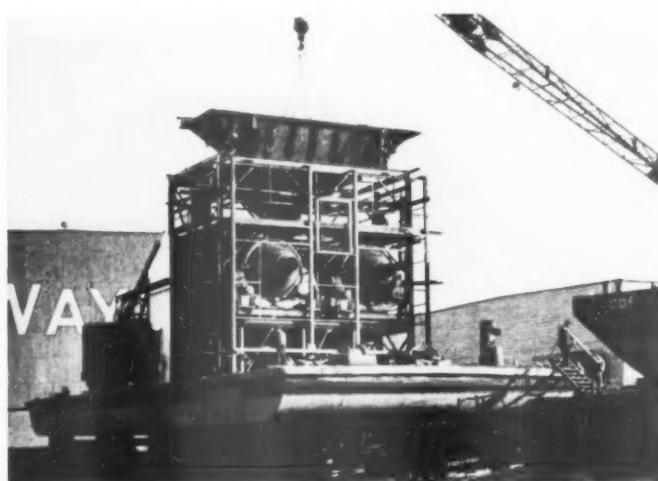
READY MIXED CONCRETE CO., Kansas City, Kan., has been purchased by the Stewart Sand and Material Co., and will continue to bear the same name. The Stewart company operates a sand plant near Turner, Kan., a crushed stone plant near Independence, Mo., and concrete batching plants and building supply yards at various locations in the Kansas City area. Officers of the firm are: John Prince, president; George W. Garrett, vice president; S. E. Honey, treasurer; W. J. Stewart, sales manager; and George H. Cook, general superintendent.

EDMUND AND CAL KUITU are constructing a bulk cement storage and mixing plant at Cloquet, Minn. The new plant, when completed, will have a storage capacity, in two airtight steel tanks, of 640 bbl. of cement. Water tanks and the cement and aggregate bins at the mixing plant are being fitted with automatic controls.

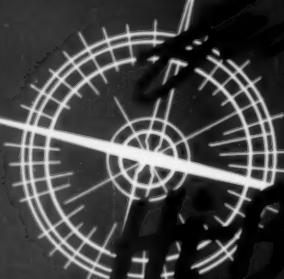
CONCRETE MASONRY MANUFACTURERS ASSOCIATION, Los Angeles, Calif., has resumed the sending of monthly news releases to the press, in accordance with its new publicity program.

LIMESTONE PRODUCTS READY-MIX PLANT, Menominee, Wis., had buildings and mixing equipment partially destroyed in a recent fire.

U. S. CONCRETE PRODUCTS CO., is producing ready-mixed concrete at Upper Sandusky, Ohio.



Concrete mixer boat with capacity of 80 cu. yd. per hr.



From coast to coast

more and more ready-mix operators
are using

HI-BOY TRUKMIXERS!

WITH so many profit producing features, no wonder more and more ready-mix operators all over the country are buying Blaw-Knox HI-BOY Trukmixers. In addition to mixing concrete thoroughly and uniformly, and discharging *all* the concrete in the drum, without segregation, the HI-BOY with the exclusive new Revolving Hopper permits 50% faster charging, faster discharging, with minimum seal maintenance. These and the many other efficiency features account for the HI-BOY Trukmixer's nation-wide acceptance, typified by the statement of C. A. Williamson, Superintendent of A. Teichert & Son, Inc., of Sacramento. He says, "Our Blaw-Knox 4½-yd. Trukmixers are easy to keep clean and are free from tailgate trouble, the major maintenance problems with other mixers. With the new Revolving Hopper and the wide spiral blade arrangement, we find that they load faster and discharge low slump concrete faster than any other mixer we own."

Take Mr. Williamson's word for it and get the full details. And when you check the advantages of HI-BOY Trukmixers, it will pay you to investigate the Blaw-Knox Ready Mixed "Package" . . . your *only* source for a complete line of everything you need in a Ready Mixed set-up to speed your work and cut you in on the big time profit. Bulletin 2223 gives full details on HI-BOY 2, 3 and 4½-yd. Trukmixers. Also ask for information on Blaw-Knox Batching Plants for aggregates and cement.

BLAW-KNOX DIVISION OF BLAW-KNOX COMPANY, 2035 Farmers Bank Building, Pittsburgh 22, Pa.



4½-yd. Trukmixer spreading a curb and gutter job in Evansville, Indiana.

Here's a 100% Blaw-Knox Ready Mixed Plant operating on a 5-year job in Illinois. 756 cu. yds. produced in eight hours with this 5-stap plant consisting of one Blaw-Knox 800-bbl. Portable Bulk Cement Plant, one Blaw-Knox 10-ton 2 compartment Aggregate Batching Plant, and eight 2-yd. Hi-Boy Trukmixers.



Blaw-Knox is your **ONLY** source for a **COMPLETE** Ready-Mixed "package".



Blaw-Knox Clamshell Buckets available in a wide range of types, sizes and weights.



Blaw-Knox Portable Aggregate Batching Plants come in various compartment styles and capacity ranges to meet your particular needs.



Blaw-Knox Portable Bulk Cement Plants in a wide range of sizes are available for large or small jobs.



Blaw-Knox Portable Truck Mixer Loading Plants are available in any compartment combination or capacity range to suit your requirements.

all operators like
the new revolutionary
REVOLVING HOPPER

"Our Blaw-Knox HI-BOYS are free from sagging trouble"

C. A. Williamson
A. Teichert & Son, Inc.
Sacramento, Calif.



4yd. HI-Boy Truckmixer pouring house foundation in Florida.

Blaw-Knox 4yd. HI-Boy delivering concrete to sewer job in Los Angeles. Revolving Hopper is in use to prevent segregation.



Blaw-Knox 6000lb. with Closed Bottom Plate and rear of Blaw-Knox Truckmixer (now 3000 and over 4000 lb.) used for pavement widening jobs in Denver, Colo.

This exclusive feature provides uniform and uniform concrete. Blower is supported by the rotating sleeve, which rotates the entire hopper around at every revolution. The result is uniform concrete throughout. The revolving hopper is 100% heavier than regular hoppers. Each load is helped to a more positive position to receive



The way to get rid of segregation! This is the Blaw-Knox way. The revolving hopper which holds up to 100% more concrete than regular hoppers.

BLAW-KNOX

BLAW-KNOX DIVISION OF BLAW-KNOX CO., Farmers Bank Bldg., Pittsburgh 22, Pa.

New York • Chicago • Philadelphia • Birmingham • Washington



HERE'S WHY THEY
ASK FOR 'INCOR'

TOP SPEED ON WORLD'S GREATEST HOUSING JOB

'INCOR' SAVES TIME, CUTS COSTS, ON
NEW YORK CITY HOUSING AUTHORITY'S
SOUTH BEACH HOUSES

NEW YORK CITY HOUSING AUTHORITY:
SOUTH BEACH HOUSES, South Beach, S.I., N.Y.

Architect: HENRY V. MURPHY, Brooklyn, N.Y.

Structural Engineer: FRED N. SEVERUD, New York City

Contractor for Superstructure: CAYE CONSTRUCTION COMPANY, INC., Brooklyn, N.Y.

'Incor' Ready-Mix Concrete: ROAD MATERIAL CORPORATION, Greenridge, S.I.

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LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 15 MODERN MILLS, 27,000,000 BARRELS ANNUAL CAPACITY

All-Time High Production Record

Merchandising and plant problems considered in informal sessions of National Ready Mixed Concrete Association

THE NINETEENTH ANNUAL CONVENTION of the National Ready Mixed Concrete Association, held simultaneously with the thirty-second annual convention of the National Sand and Gravel Association the week of February 14 in New York City, emphasized merchandising, production problems, material supply and legislative developments.

Some of the convention papers and discussion of interest to ready-mixed concrete producers are covered in our report of the National Sand and Gravel Association convention in this issue of *ROCK PRODUCTS*. Papers and discussion presented at the separate sessions of the N.R.M.C.A. are reported herein; many of the papers of mutual interest to both industries including reports of various committees, the executive secretary and the director of engineering which were presented at joint sessions are summarized in our report of the N.S.G.A. convention.

New Officers

Robert F. Porter, Harry T. Campbell Sons' Corp., Towson, Md., was elected president of the National Ready Mixed Concrete Association, succeeding C. "Dolly" Gray; William Moore, J. P. O'Connell Co., Boston, Mass., was elected vice-president to succeed Mr. Porter; and Norman J. Fredericks, Koenig Coal and Supply Co., Detroit, Mich., was elected secretary-treasurer to succeed Mr. Moore.

New members of the board of directors are: Louis C. Schilling, I. E.

Schilling Co., Miami, Fla.; Frank Penepacker, Readymix Concrete Co., Portland, Ore.; Frank L. Kelly, Colonial Sand and Stone Co., New York, N. Y.; and F. E. Schouweiler, Old Fort Supply Co., Fort Wayne, Ind.

Safety Competition

H. F. Thomson, St. Louis, Mo., past-president of the association and the prime mover in developing the safety competition of the association, presented the bronze safety trophies, awarded by *Pit and Quarry* to the winners of the safety competition within the association.

J. C. Clark, Lubbock Building Products, Lubbock Co., which is affiliated with the Fort Worth Sand and Gravel Co., headed by T. E. Popplewell, president of the National Sand and Gravel Association, received the trophy as winner in the large plant classification. S. Norman Holland, Jr., Pocahontas, Inc., Salisburg, Md., accepted the trophy for winning the small plant competition.

In presenting the awards, Mr. Thomson said that 91 companies participated and that 40 percent of the membership, producing $7\frac{1}{2}$ million cu. yd. of concrete, was entered in the contest. He commented that one and one quarter man-hours worked were required per cu. yd. of concrete for plants producing less than 25,000 cu. yd. annually and that, for 22 companies producing in excess of 100,000 cu. yd., 7 man-hours were required per cu. yd.

Business Outlook

President C. "Dolly" Gray, Indianapolis, Ind., in his opening address before a joint session of the N.R.M.C.A. and the N.S.G.A., reported that the membership, now the greatest in history, produced 18,967,360 cu. yd. of concrete in 1948. This is an 18 percent increase over 1947. During the year, 15 members were lost but 70 new members were added.

The development of the industry was traced and, Mr. Gray pointed out, was due to unity of action of the industry by combined research and accumulated knowledge made available to all. He told of the hardships during the early days of the industry in introducing and gaining acceptance for ready-mixed concrete and gave a great deal of the credit to Executive Secretary V. P. Ahearn and Director of Engineering Stanton Walker. He said that at least 85 percent of the concrete mixed in cities of 20,000 or more population, excluding the city of Chicago, is delivered as ready-mixed concrete today.

Mr. Gray summarized all the accomplishments of Mr. Ahearn and those of Mr. Walker in selling the principles of ready-mixed concrete. He expressed appreciation on behalf of the association for the contribution of the N.S.G.A., the Manufacturers Division and the associate members to its development and success.

Mr. Gray believes that 1949 should show a demand for ready-mixed concrete at least equal to that in 1948, but cautioned that the easy years of prosperity have led to extravagant and inefficient practices which will be difficult to discontinue. In closing, he expressed his thanks to the officers, Board of Directors, V. P. Ahearn and Stanton Walker for their co-operation and help.

Admixtures in Concrete

One of the most interesting technical papers presented as a session for the National Ready Mixed Concrete Association was "Tests of Admixtures in Concrete" by Delmar L. Bloem, associate research engineer for the association. The speaker summarized the results of tests carried out at the research laboratories of the association at the University of Maryland on various admixtures offered to the trade. Admixtures tested were not named but numbered. He did give their general classification.



President-elect of N.R.M.C.A., Robert Porter, left, with outgoing president, C. "Dolly" Gray, and William Moore, vice-president, right

READY-MIX



James Leonard, left, and H. F. Garvin Pelsus,
Metropolitan Sand and Gravel Corp., Port
Washington, N. Y.

Admixtures 1, 2, 3 and 4 are saponified resins. No. 1 is a vinsol resin in sodium hydroxide. No. 2 was described as a highly concentrated saponified resin in solution form. No. 3 is a vinsol resin in solution form, and No. 4 is a manganese resinate and is in the form of a heavy solution. No. 5 was described as a solution of "stable, neutral, organic compound" that acted as a dispersing and air-entraining agent. No. 6 is a solution of a triethanolamine salt of a sulfonated hydrocarbon and resembled the resinates.

Admixtures No. 7 and 8 are pure detergents of the household washing compound type. Agents 9 and 9a are different lots of material bearing the same trade name. No. 10 is a similar product from the same manufacturer, and the latter three were described as air-entraining and dispersing agents containing an accelerator. No. 11 was similar but had no accelerator.

Agent No. 12 is a bituminous compound with air-entraining characteristics and probably not intended for concrete use. No. 12a is also a bituminous compound from the same man-

ufacturer but which does not entrain air. No. 13 is another non-air-entraining agent of unknown composition. Its use permitted a slight reduction in water and retarded the set somewhat.

The speaker described how the tests were conducted and said that the work covered a three year period. Each series of tests consisted of a comparison between normal concrete and admixed concrete with both lots prepared at the same time. The speaker showed tables that resulted from the test that gave the characteristics of concrete and compressive

some of the more sensitive admixtures in a uniform manner was highly desirable.

In his conclusions, based on 92 batches and 297 cylinders, Mr. Bloem brought out that none of the admixtures produced excessive losses in strength when proper allowances were made in the design of the concrete. In general, those admixtures which permitted the largest reduction in water content produced the highest concrete strengths. He said that in most cases the admixtures which were classified as containing detergents or dispersing agents performed better in these respects than the resin-type foaming agent, or those containing bituminous compounds, and that, in general, those admixtures that contained both dispersing and accelerating agents produced the highest relative strengths of any of the air-entraining agents.

He pointed out that air-entraining admixtures (with one exception) produced relatively high 7-day strengths. More strength was gained in that time than for similar normal concretes.

Admixture No. 13 gave the highest strength at all ages of any but it did not contain air and had poorer relative workability and segregated (and bled) more than air-trained concrete.

In the discussion of this paper, it was pointed out that some manufacturers of air-entraining compounds recommended reductions in the amount of cement used, and others an increase, but it was indicated by the speaker that reduction in the amount of cement would be relatively small. One operator asked about the loss of air from too much mixing and it was maintained that a reasonable amount of mixing time was allowable. No one seemed to want to define "reasonable."



M. Eugene Sundt, Albuquerque, N. M., left,
chats with Howard Staley of M.I.T.

strengths. Also, a second tabulation showed the effect of admixtures on air content, water requirement and strength of concrete. Four slides were shown that summarized the results of the tests.

In conducting the tests, it was found that the air-entraining capacities of the different admixtures varied widely. The quantity required for each percent of entrained air ranged from one part in 160,000 (No. 7) to one part in 250 (No. 9) based on cement weights. This indicated, he said, that diluting



Presentation of safety trophies in ready-mixed concrete competition to S. Norman Holland, Jr., Pocahontas, Inc., Salisbury, Md., and to J. C. Clark, Lubbock Building Products, Lubbock, Texas. H. R. Thomson made the presentation. T. E. Popplewell looks on with approval in right hand picture



Cement and Aggregate Supply

APAPER ENTITLED "The Supply of Cement and Aggregates in 1949" was presented by Executive Secretary V. P. Ahearn who had summarized returns from letters he had received from executives of cement companies. His summary was based on nationwide response and he expressed his appreciation to the cement industry for its generous response and desire to co-operate with the ready-mixed concrete industry.

Cement will be easier in supply in 1949 than it has been, for the country as a whole, but there will be periodic spot shortages. Mr. Ahearn, in his letter, had asked cement manufacturers if sufficient cement would be available in 1949 for a construction volume of \$18,750,000,000 which has been predicted by the U. S. Bureau of Labor Statistics. In answer, he received a detailed study of all the economic factors which will influence cement production in 1949. Cement production of 205,200,000 bbl. in 1948 was an all-time record. A few new cement plants were built in 1948, he said, but the record-breaking production came mainly from modernization and expansion of existing plants and plant rehabilitation programs. This factor will play the pivotal role in 1949 when another all-time record, of 210,000,000 bbl., likely will be set. Mr. Ahearn is fully appreciative of the fact that present conditions discourage large scale expenditures for additional cement production. More than one cement plant faces the prospect of reduced production in 1949 because of deferred repair programs which can no longer be delayed.

In advocating close co-operation with the cement industry, Mr. Ahearn said that approximately 15 percent of the total cement production is marketed in the form of ready-mixed concrete. Some cement companies ship as much as 40 percent of total production to ready-mixed concrete producers. The main hope, he said, for meeting the great construction demand is to stretch out the construction season each year, and the cement industry is requested that the ready-mixed concrete industry do all it can to get construction started early. Also, it is suggested that equipment be made available to unload bulk cement from box cars.

Several cement companies said that better quality of coal is now being made available. Multiplicity of cement specifications has contributed to reducing potential cement capacity, and it was urged to limit requirements to type I wherever practicable. Freight rates on cement have increased 60 percent since July, 1946.



W. E. Ryberg, Salt Lake City, Utah

scribed the artificial lightweight aggregate (Solite) prepared by his company. He said that his company was in the sand and gravel and ready-mixed concrete business and went into the lightweight aggregate manufacturing business so as to supply the needs of the contractors, because competing materials often cut down the running time of their plants. He described the material as being similar to Haydite. Pre-wetting or pre-soaking lightweight aggregates in the mixer before adding cement was recommended but it was pointed out that this did not always work out. The workability of lightweight concrete is on a different plane than normal concretes because the coarse light aggregates are lighter than the fines and as a result segregation problems develop. He said the slump in the lightweight concretes is usually less than for normal concrete. Air increases the workability in lean mixes but, in rich mixes (8 sack), no air is needed to get good workability.

Eugene Sundt, Albuquerque Gravel Products Co., Albuquerque, N. Mex., said that architects were a factor in getting him into the lightweight concrete business. In his area, pumice and volcanic cinders are easily available and the use of roof decks of pumice concrete are standard practice. "A contractor and his mixer might get ideas," he said. He mentioned that pre-cast pumice concrete houses in his area were becoming common. Sometimes sand is added to the pumice concrete to improve its grading, but this increased its weight and resulted in some loss in insulating value. When sand was added, some cement



J. L. Shiely, St. Paul, Minn., left, and Alexander Foster, Jr., Philadelphia, two past presidents of the N.R.M.C.A.

Lightweight Aggregates

A paper, "Lightweight Aggregates for Concrete," that was prepared by Oliver C. Ralston, Chief, Division of Metallurgy, and J. E. Conley, Chemical Engineer, Eastern Experimental Station, both of the United States Bureau of Mines, was delivered by John Rupert. He described lightweight aggregates as any materials that would give a concrete weighing 100 lb. per cu. ft. or less. He outlined in a general manner the savings to be made by use of lightweight concrete from a structural standpoint (weight saving). He gave a brief outline of the various lightweight materials including pumice, cinders, scoria (volcanic cinders), slag, vermiculite, perlite, the expanded clays, coated and expanded clays, etc., describing their sources and some of their characteristics.

John W. Roberts, Southern Materials Co., Inc., Richmond, Va., de-



Wyatt B. Hedges, Fort Lauderdale, Fla.



Claude Clark, Columbus, Ohio, left, J. E. Morrissey, Cleveland, Ohio, center, and A. Richter, Cincinnati, Ohio, right

could be saved, or better strengths obtained with the same cement factor. He said that more water was needed for pumice concrete than for regular concrete and that this sometimes re-

sults in more bleeding. (For a more detailed discussion of strengths that can be obtained with pumice concretes we refer the reader to the September, 1948, issue of ROCK PRODUCTS.)

Markets for Ready Mixed Concrete

AN ENTIRE SESSION of the National Ready Mixed Concrete Association, under the chairmanship of Robert C. Collins, was devoted to merchandising and promotion. Thomas Austern substituted for Charles A. Horsky and spoke on the "Decision of the United States Supreme Court in the Cement Case." Both Mr. Horsky and Mr. Austern are members of the same law firm.

Mr. Austern said that every once in a while there comes along a tidal wave that engulfs familiar practices, and named several examples including the subject under discussion. He outlined the five principal types or systems of selling: (1) uniform delivered price selling, such as applies to stamps, dollar watches, etc.; (2) zoned delivered pricing; (3) single basing point selling; (4) multiple basing point selling; and (5) selling f.o.b. factory where transportation is absorbed to meet competition.

The second paper was presented by W. D. M. Allan, Director of Promotion, Portland Cement Association, who had as his topic, "Markets for Ready Mixed Concrete in 1949." He reviewed the predictions for construction in 1949. From three different sources, the estimates were 18.17, 18.1, and 18.75 billions of dollars, and were all slightly above the 1948 figures for dollar volume. He said that the dollar volume for residential and farm construction will be less than for 1948 and that dollarwise, public construction will offset the difference. He pointed out that these estimates are national in scope and probably will not apply to a particular area. The reduction in farm construction con-

tended, he said, was in spite of the fact that the farmers now have an estimated 20 billions of dollars of cash reserves and this figure was higher than ever before. However, he felt that, in some areas, farm construction would exceed the volume of 1948.

Mr. Allan said that the ready-mixed concrete industry had two selling jobs; immediate business selling, and future market selling or what he called market insurance. He said the Portland Cement Association was organizing hundreds of quality concrete schools to teach engineering and architectural students, practicing architects, contractors, etc., so as to reestablish in their minds the simple fundamentals of quality concrete. He also pointed out that new and inexperienced men are constantly being drawn into some phase of the concrete industry and the association wants this type of person to come to the schools. Mr. Allan said that the Portland Cement Association considered the promotion of quality concrete as the No. 1 market insurance activity for the years 1949 and 1950. He advised that more diversified markets be developed, for a large single market may dry up quickly, and that each producer should know personally every prospective user of concrete in the area he serves.

Open Forum on Merchandising

The forum on merchandising was rather short because of time limitations. The chairman remarked that the number of salesmen attending the meetings was a good indication of interest in merchandising. A. R. Shiely, St. Paul, Minn., said that cement companies lost some good will

by changing prices overnight and that cement shipped into his area was delivered on several price systems, (a) mill price plus freight, (b) the same, but a higher price and, (c) one is meeting the competition of the others. Five cement manufacturers serve his district, he said.

Louis C. Schilling, I. E. Schilling Co., Miami, Fla., told of cement being hauled into Miami, Fla. distances up to 900 miles, resulting in wide differences in cement costs, and he told of his method of getting a weighted average cost for the materials for production purposes. John W. Murphy, Union Sand and Gravel Co., Spokane, Wash., told briefly of how he ran display advertisements in the newspapers for 9 months of the year and, in the Fall, slanted the ads to reach the farm trade. He said his company serves a market area of about 30 miles radius, and that he had salesmen out in the territory. R. P. Mumford, Beckley & Meyers Co., Springfield, Ohio, said his company advertised in the newspapers, had one salesman and used radio advertising. Mr. Mumford also told of a school his company held for all employees. It was held one night per week for 1½ hr. No one was compelled to come but, once they started, the sales employees were expected to come regularly and to finish the course. He also told of conducting the class through nearby cement plants where the employees could see how cement was made and tested, and learn how cylinders were tested. This basic knowledge has made for better sales background. He said his company serves an area with a population of about 90,000.

C. P. Maloney, Jr., Maloney Concrete Co., Washington, D. C., asked for comments on what various companies do when it rains on Monday, assuming the week's production was scheduled. There was considerable pro and con on this subject, but the theme revolved around selling a policy and then sticking to that policy. Later in the discussion, H. F. G. Pelsue, Metropolitan Sand and Gravel Corp., New York, brought a round of applause when he said to forget about the rain last Monday and think about the sunshiny days of 1953, because if the industry as a whole does not think ahead that far, companies may find their fleets of trucks tied up because of no business. He urged that thought be given to increasing the use of ready-mixed concrete through national promotion and that this be carried out by local groups.

Herbert Jahneke, New Orleans, La., told of Birmingham cement being knocked out of his market and of using imported Belgium cement without resentment. This was necessary, he said, because the local cement plants based allotments on 1944 purchases. He said he protected his contractors as regards price and thus built up good will. R. K. Humphries, Pacific Coast Aggregates,

READY-MIX

Inc., San Francisco, Calif., said there were no cement shortages in his area and that contractor cancellations helped to balance up for the rained-out days. He mentioned that salesmen were out in the territory digging up business. Frank L. Kelly, Colonial Sand and Stone Co., New York City, spoke briefly of practices in the metropolitan area of New York City and of the spread in cement prices because of docks being outside the towing area.

Ohio Ready Mix Producers

The Ohio Ready Mixed Concrete Association held its ninth luncheon meeting on Wednesday noon in New

York City, in connection with the annual convention of the industry. R. P. Mumford, president of the association, presided. Claude L. Clark, secretary of the association, read his report after which W. D. M. Allan, director of promotion, Portland Cement Association, gave a brief talk on the importance of quality concrete. He said the association had 50 men conducting concrete quality schools in various sections of the country. As Mr. Allan gave a more comprehensive talk on a similar subject before a general session of the National Ready Mixed Concrete Association, we refer the reader to that report. There were 69 present at the luncheon.



F. P. "Bud" Spratlen, Denver, Colo., gets chummy with R. K. Humphries, San Francisco, in meeting. Bob Collins is at left

Testing Concrete - Operating Problems

AT ONE of the technical sessions of the N.R.M.C.A. convention, Julius J. Warner, Richter Concrete Corp., Cincinnati, Ohio, spoke on "Recommended Practices for Sampling and Testing Ready Mixed Concrete." Mr. Warner, chairman of the committee to study recommended practices, told of the near confusion in many sections due to the violation of A.S.T.M. requirements for testing ready-mixed concrete, and of a survey that strikingly brought this fact to light. Stanton Walker told of a revised booklet on testing of ready-mixed concrete that was now being mailed to the members of the association.

The open forum on operating problems first considered the "Cause and Prevention of Formation of Cement Balls." It quickly developed that there are several types of cement balls and all non-related. A. R. Shiely told of a condition in his area where hot cement delivered during rains sometimes resulted in cement balls in the bottom of his silos. These were removed when necessary and used for jobs where strength is of little importance. However, it appeared that the intent of the meeting was to discuss cement balls in the mixer. It was suggested that more mixing would solve this trouble, and that overloading of the mixer was a factor. Another suggestion was that the trouble may

be due to too dry a mix, and that the order in which the materials went into the mixer might be a factor. It was further suggested to add the water and the cement first and then the aggregate, and that with higher speeds of the mixer drum no cement balls would form. At slow mixer speeds, this producer did have trouble at times. The general impression gained from the discussion was that it was not too much of an operating problem.

A discussion on hot cement brought up a variety of opinions. Some maintained that it was not troublesome. One producer said that he was glad to get cement, hot or cold. A. R. Shiely told of having had 7-day concrete that was good, but at 28 days was not too good, and still later developed full strength. He thought that the trouble was due to green (hot) cement, plus hot weather. One producer suggested that dehydration of the gypsum was a factor and that it led to flash set in the mixer. Others spoke of having trouble with flash set when using hot cements.

On the subject of "Dust Control During Loading of Transit Mixers" Robert F. Porter, Harry T. Campbell Sons' Corp., told of using a fan with a vacuum shirt that could be raised or lowered so that cement dust from the loading operation could be collected. He said that recovery was from 2 to 4 bags of cement per day and that the plant was kept clean and better looking as a result of the installation.

On the subjects, "Keeping Mixers Clean" and "Procedure for Handling Mixing Water and Wash Water," there were many diverse techniques discussed, all informally. C. Gray showed a small device (two of them) that he used in his plant to insure proper mix controls. E. J. Nunan, Buffalo Slag Co., said that his company added the mixing water at the plant and the operator had nothing to do with it; 20 gal. of wash water was left in the drum for the next load. A. R. Shiely said he used pre-mixed techniques and that the drivers know

what slump means and act accordingly. From a display of hands it appeared that it was about 50-50 as to whether water was left in the mixer for the next load, or whether the wash water was discharged. Irving J. Warner, Jr., Warner Co., asked the minimum amount of wash water used by the other operators and one operator said he used as little as 8 gal. with a 2-cu. yd. mixer. Another used 10 gal. minimum with a 3-cu. yd. unit, and a third said he did not use any at all, but washed out his mixer every night and had no trouble as a result.

Prestressed Concrete

CONCRETE PUBLICATIONS, LTD., London, England, has announced a new illustrated book, "Prestressed Concrete," by Professor G. Magnel, an eminent reinforced concrete engineer with English and continental experience. The publication describes principles of prestress, which, in almost every case, are corroborated by tests made by the writer and by the behavior of structures he has designed. A semi-graphical method of calculation is given, which is applicable to the design of beams prestressed by any method. Also discussed are the design of simply supported beams and slabs; the design of continuous beams with tests on prestressed beams of various kinds, including a continuous beam; tests to determine the amount of creep in concrete and steel and to establish the fact of the high resistance to buckling of prestressed members; the reduction in the prestressing force consequent upon shrinking of the concrete and creep, the reduction due to stretching the wires in pairs, the slipping of the wires in fixing devices, etc., and coefficients for use in practical calculations. Suitable working stresses are recommended.

Movie on Salesmanship

A NEW 16 mm.-sound movie, "The Things People Want," covering basic salesmanship, is available through The Jam Handy Organization, 2821 E. Grand Blvd., Detroit 6, Mich. Importance of product knowledge, rules for handling people and buyers' requirements are stressed in the film.



Charles E. Brady, Lilesville, N. C., left, with Louis C. Schilling, Miami, Fla.

Concrete Institute Holds New York Meeting

Technical papers deal with important phases of concrete placing, testing and maintenance

THE AMERICAN CONCRETE INSTITUTE held its forty-fifth annual convention February 23-25 at the Statler Hotel, New York, N. Y., and as usual, many papers were presented that should be of interest to readers of ROCK PRODUCTS. Herbert J. Gilkey, Iowa State College, Ames, Iowa, was elected president of the institute succeeding Robert F. Blanks, Bureau of Reclamation, Denver, Colo.

The first convention session was presided over by Robert F. Blanks with Frank H. Jackson acting as chairman of the technical program. The first speaker was B. D. Tallamy, superintendent, State Department of Public Works, New York. The subject of his talk was "Control of Scaling on Portland Cement Concrete Pavements Resulting from the use of Chloride Salts." He described the practice in New York state of adding 50 to 75 lb. of sodium chloride to a cubic yard of sand and using this mixture to help remove ice from concrete pavements. However, in some places it was necessary to use the straight salt, since public demand made it necessary regardless of what the action would be on the pavements. He mentioned using as much as 600 lb. of sodium chloride per two-lane highway per mile. About 1936, some experiments were made, using various admixtures including tallow, fish oil, vinsol resins, etc.

New pavements, two or three years old, were more vulnerable to scaling from salts than were the older pavements, he said. In 1947 it was observed that the up-hill portion of a roadway had less scaling than the parallel, down-hill part, and that the up-hill section had more oil and grease from crank-case drippings splattered on its surface. This led to laboratory experiments, using a 10 S.A.E. oil diluted with gasoline as brush coat on cubes of concrete. These specimens were made with one, two and three brush coats. Untreated cubes of concrete, in the freezing and thawing tests, lost as high as 72 percent whereas the oil-treated specimens lost 4.6 percent, 3.6 percent and 0.3 percent for the one, two and three coats, respectively. Similarly, 25-cycle tests on specimens with a one brush coat lost only 0.5 percent. The tests were so favorable that road experiments are now underway in which are used 1/20 gal. per sq. yd. of a 50:50 mix of crude oil and gasoline, or even crank case oils. A 5 S.A.E. oil cut with a solvent also is being used, and costs about 11c per

gal. at the refinery. The mix is sprayed on the pavement in 12 ft. swaths at the rate of 2 m.p.h., and about 25 percent more than the amounts used in the laboratory are used. The material is absorbed in the pavement within 15 minutes and traffic can then be diverted over the treated roads. The mix used costs about 1c per sq. yd. of surface treated. The mix does not make the concrete slippery, or does it change the color of the pavement. Mr. Tallamy said that about 60 miles of experimental pavement were sprayed in 1948 and these pavements included some poured air-entrained concrete. The tests were conducted in such a fashion that comparisons between air-entrained and non-air-entrained concrete roadways could be observed. He showed several slides of roads being treated. He indicated that use of the spray on concrete pavement that was already partially covered with an asphaltic film made that road too slippery and therefore dangerous. The speaker also told briefly of tests underway in New York whereby small amounts of asphaltic materials were added to the concrete at and in the mixer.

In the discussions that followed, it developed that Mr. Tallamy thought it might be necessary to treat the road beds every two years. Hubert Woods, director of research, Portland Cement Association, told of experiments made in 1936 along similar lines using linseed oil and other organic oils.

Air-Entrained Concrete

The next three papers all were on the same general theme and related to air-entrained concretes. The first, presented by Charles M. Noble, State highway engineer, Trenton, N. J., covered "Experience with Air-Entrained Concrete in New Jersey." J. F. Barbee, engineer, Ohio Department of Highways, spoke on "What Have We Learned About Air-Entrained Concrete." The last paper, by Robert F. Blanks and W. A. Cordon, both of the United States Bureau of Reclamation, discussed "Practices, Experiences and Tests with Air-Entraining Agents in Making Durable Concrete."

Anyone hearing these papers and the discussions that followed would have ample evidence that air-entrained concrete is highly successful, is here to stay, and is one of the outstanding developments in concrete that has come about in many years. Mr. Noble told of the history of the use of air-



Prof. H. J. Gilkey, Iowa State College, elected president of the American Concrete Institute

entraining agents in New Jersey, and said that the results were so favorable that it is used in all concrete. He said they tried to get a 4½ percent air content and that 3 to 6 percent was acceptable. He spoke of using Darex with excellent results. One feature commonly overlooked in air-entrained concrete is the extra bulk of concrete resulting when that material is used, and that this increase in bulk (due to the entrained air) could be used by adding more cement to off-set slight losses in strength due to the air admixtures. He stated that in many cases the strength loss due to using air-entrained concrete was temporary and that 25 percent of the loss in strength was regained the first year. He also told of the possibility of insulating long concrete slabs during the first 24 hr. of set to insulate them against temperature differentials, and that this might be important.

The discussions of experiences with air-entrained concrete were numerous and covered many of the states of the Union and each speaker gave about the same observation, namely, their favorable experience with air-entrained concrete.

Robert F. Blanks said that the U. S. Bureau of Reclamation had extended the use of air-entrained concrete to all concrete structures regardless of climatic locations. He said that its use helped minimize damage due to wetting and drying, heating and cooling. He ended by saying, however, that the use of air-entraining agents would not make good concrete out of poor concrete. Stanton Walker, engineering director, National Sand and Gravel Association, took mild exception to this portion of the paper. Mr. Walker outlined some results that indicated that it was possible to make good concrete out of material which, if used without air-entraining agents, very definitely yielded poor concrete. Someone asked if it was satisfactory to use calcium chloride in air-entrained concrete and Mr. Blanks said that salt

has been used in air-entrained concrete without any detrimental effects. When asked if it was better to intergrind the air-entraining agent at the cement mill, or add it in the mixer, he answered that either way was satisfactory. In answer to a question as to whether air-entraining agents, when added to concrete, would help improve concrete that is inferior due to the presence of reactive aggregates, Mr. Blanks said that air-entraining agents would help but that it was not practical because of the amount required.

One member pointed out that the Germans used a no-slump concrete in the construction of the Autobahnen (Germany's highway system) and secured excellent concrete, but that similar practices had not been followed in this country. He asked why we do not follow the examples set in Europe. It was pointed out that the reason revolved about higher costs here than in Germany, and this developed the question as to whether or not higher mechanical skills could not be used to develop a method of placing no-slump concrete by mechanical means. Someone pointed out that the vacuum process was being used to place no-slump concrete in this country. It also was pointed out that this was not a comparison. A member told of concrete practices in Sweden where a no-slump concrete was used along with air-entraining agents. Another asked about the degree of erosion of air-entrained concrete due to water (such as a spill-way over a dam) and Mr. Blanks said erosion effects were negligible and that the Bureau of Reclamation used 3 percent air content concrete for this purpose.

Structural Concrete Design

Thursday morning's session was devoted to structural design with Herbert L. Gilkey acting as chairman. The entire session was devoted to subjects of interest to the structural engineer with the following papers being delivered: "Rational Analysis and Design of Two-Way Concrete Slabs," Chester P. Siess and Nathan M. Newmark, special research assistant professor of theoretical and applied mechanics, and research professor of civil engineering, respectively, University of Illinois, Urbana; "Reinforced Concrete Wall and Column Footings," Frank E. Richart, research professor of engineering materials, University of Illinois, Urbana; "Experimental Aids in Structural Concrete Design," Robert E. Glover, O. J. Olsen and Carl Zangar, senior engineer and engineer of the structural research section, and head, photoelastic laboratory, respectively, U. S. Bureau of Reclamation, Denver, Colo. All these papers have been published in the A.C.I. Journal.

Annual Awards

Following the get-together luncheon held Thursday, President Blanks presented the annual awards which were as follows: The Leonard C. Wason

Medal for the "Most Meritorious Paper" of A.C.I. Proceedings Vol. 44 (June, 1948, Journal) to Frank H. Jackson and Harold Allen for their paper, "Concrete Pavements on the German Autobahnen"; The Leonard C. Wason Medal for "Noteworthy Research" to Richard C. Mielenz, Kenneth T. Greene and Elton J. Benton for the work reported in their paper (Proceeding Vol. 44, November, 1947, Journal) "Chemical Test for Reactivity of Aggregates with Cement Alkalies; Chemical Processes in Cement-Aggregate Reaction" and the American Concrete Institute Construction Practice Award for a "paper of outstanding merit" on concrete construction practice to Raymond E. Davis, E. Clinton Jansen and W. T. Neelands for their paper in the A.C.I. Journal (April, 1948), entitled "Restoration of Barker Dam."

Gomez Perez, civil engineer from Mexico City, Mexico, told of an international meeting of engineers to be held in Mexico City the first week in May of this year. Following the week's meeting, trips are to be arranged for the visitors to see cement plants, large construction jobs that are underway, and other projects that will be of interest to visiting engineers. An invitation was extended to come to the meeting.

Future For Concrete

Robert F. Blanks, retiring president, gave a brief but prophetic talk on the future of concrete and predicted that if one could look ahead (as in a crystal ball) for the next 50 years he would find that the definition of aggregate would have undergone a change so as to include "activity" as a part of that definition. He thought it possible that cement chemists, and concrete engineers as such will have faded from the picture to be replaced by "prescriptionists," and that alkalies would be put into concrete, instead of being taken out of concrete. Electronics, and similar highly scientific tools, will find extended use in concrete, and concrete in the 40,000 to 50,000 p.s.i. range will be the attained goal at that time. This highly inspirational talk by Mr. Blanks, who is chief of the engineering and geological control and research division of the United States Bureau of Reclamation, undoubtedly had behind it scientific trends that may, over the years, lead to the fulfillment of his predictions, for certainly few men in the United States have the organization and facilities from which to project research in concrete that could lead to the goals he mentioned.

Controlling Ready-Mix Uniformity

Stanton Walker, director of engineering, National Ready Mixed Concrete Association, gave a paper on "Controlling the Uniformity of Ready Mixed Concrete." His talk outlined the problems of the pre-mixed (central

mix), and the transit mixed concrete operators, and outlined the advantages and disadvantages of each system. He gave a brief history of the ready-mixed concrete industry, stating that the first known commercial venture was in Boston in 1916 and that in the same year Stephen Stepanian applied for patents relating to the equipment to be used. In 1920, the West Jersey Sand Co. and the Fort Worth Sand and Gravel Co. both started ready-mixed concrete operations that are still in business today. Mr. Walker also dwelt briefly on the non-agitator type of body and its use with modern air-entrained concrete. The speaker gave the hearers a well-rounded picture of the problems relating to the industry, touching upon such topics as time of mix, water control in the mix, etc. Mr. Walker was followed by Alexander Foster, Jr., of the Warner Co., Philadelphia, Penn., who told some of the problems with which he has had to deal in his area, citing that 67 different mixes (due to aggregate size complications) are standard practice, and that it is necessary to have 14 brands of cements available. He said that the ready-mixed concrete business was by no means on the defense and that, as a generalization, ready-mixed concrete was better than job-produced concrete both in quality and in cost.

One speaker told of a poll taken among 18 job superintendents as to experience with ready-mixed concrete, and the poll revealed that all the superintendents' experiences had been very favorable, especially where the concrete came from large concerns. Several other experienced ready-mixed concrete operators gave brief talks from the floor outlining their experiences. Metropolitan Sand and Gravel Corp., New York City, according to the speaker, controls all water at the plant, and each driver going to a specified job is told to start his mixer at a specified street intersection. If any conflict occurs, a service man is sent to that street intersection to contact the driver, and to explain the correction. Another speaker said that, in his opinion, more concrete was spoiled because of a short mixing time than from a long one and outlined a 4-hr. mix test that was used at one place. An executive from a testing laboratory deplored the practice in some areas of selecting a laboratory as a result of competitive bidding. In such cases, the low bidder was, in essence, working for the contractor. The report of Committee 616 on the "Proposed Recommended Practice for the Application of Portland Cement Paint to Concrete Surfaces" was adopted, with R. E. Copeland acting as chairman.

On Friday morning the opening session on research was held. This annual feature was a confidential session as speakers give brief talks on work they have been doing which for the most part is still in the experimental stages.

(Continued on page 190)

California Pipe Producers Meet

Drain tile specifications, absorption tests, irrigation pipe research discussed

THE CALIFORNIA ASSOCIATED CONCRETE PIPE MANUFACTURERS held their 30th annual meeting February 17-18 at Fresno. At the opening session, a report was made of the meetings held during the latter part of 1948 with engineers of the State Division of Highways on the revision of the Standard Specifications for 1949, which will be off the press soon and obtainable by request from Sacramento. The new specifications will include three chapters on concrete pipe and its installation, titled as follows: Section 51—Reinforced Concrete Pipe Culverts and Siphons; Section 54—Non-Reinforced Concrete Pipe Lines, and Section 55—Sewer Pipe Lines.

Section 51 covers culverts used for drainage and pressure lines, using various types of concrete pipe, general installation provisions and special provisions for installing the different types of highway crossings with different sizes of concrete pipe, all reinforced; and section 54 covers C118 pipe used for irrigation and drainage "other than under the highway roadway." A considerable number of changes from the Standard Specifications of April 1945 are reported which manufacturers were urged to study carefully with particular regard to installation procedures. Pertinent to the foregoing was a discussion on the possibility of designed inlets for highway crossings to obtain full capacity of the culvert.

Drain Tile

Considerable discussion was held on the proposed revision of the specifications for concrete drain tile, A.S.T.M. C4-24. R. J. Reynolds, Superintendent of the Imperial Irrigation District, which embraces over 600,000 acres, reported on the extensive use of clay and concrete drain tile in that district. Several hundred miles of drain tile have been used, which was at the start largely clay tile of 4-, 6- and 8-in. diameters. In the last two years about 750 miles of clay and concrete drain tile have been installed to remove the accumulation of salts. Mr. Reynolds described in some detail the installation methods, explaining that the tile were bedded on about 2 in. gravel with the gravel up to the top of the pipe and tar paper over the upper segment of the joints. Because of the salts in the soil, concrete tile is being made with Type II cement.

Butt-end joints are being used generally, and Mr. Reynolds stated that in some cases the ends of concrete tile were rather rough, causing too much clearance at the joints. A suggestion as to use of tongue and groove joints caused Mr. Reynolds to com-

ment that these may seal off and that where butt-end joints were made and installed properly, they had proven entirely satisfactory. The pipe must be smooth for velocity because of the flat grades, and of good quality concrete of low absorption.

It was suggested that members interested should send for an article on tile drains by J. W. Farwell, Jr., entitled "Reports on Methods Used in Imperial Irrigation District for the Design and Installation of Tile Farm Drains." The report can be obtained from Mr. Tabor, Engineer, Palo Verde Irrigation District, Blythe, Calif.

A report was given on activities of the American Concrete Pipe Association, whose 41st annual convention was held at Richmond, Va., March 9-13.

Irrigation Pipe Research

Washington State College submitted a report on its Irrigation Pipe Research program which is being assisted financially by the Concrete Products Association of Washington and C.A.C.P.M. The investigation is being conducted to determine the cause, effect and possible remedies for the "Reduction in Flow Capacity from Air Entrainment" and "Shock Wave Generation" in concrete irrigation pipe. Considerable progress has been made in field investigation in the Yakima Valley, and laboratory tests are being made on various sizes of plastic tubing to simulate field conditions. The summary of the 2nd Quarterly Report states that "breakage of concrete irrigation pipe has been attributed to shock waves (water hammer) which produce excessive dynamic pressure. It is believed that these shock waves are generated by air action that occurs when a large volume of air escapes from a vent. Analysis of observations and measurements on reduced flow lines indicate that pocketed air is the main cause of reduced flow. Although most lines that were reported to have reduced flow were on an even mean grade, it was observed that the variation of grade between individual joints of pipe was appreciable. This variation of grade between joints is believed to be enough to allow air to be pocketed at the summits where grade changes occur." Laboratory studies on all phases of these problems are currently being carried out or are planned for the future."

As the W.S.C. program is carried out, much valuable information will be obtained relative to concrete pipe irrigation systems, it was observed.

Absorption Tests

Two types of tests on absorption of concrete pipe were reported upon, the first having to do with the results



H. W. Chutter, newly-elected president, California Associated Concrete Pipe Manufacturers

obtained by drying the test specimens at different temperatures, and the second covering a comparison of absorption test results on cored specimens with the specification type.

For the drying tests, pipe was furnished to the Materials and Research Department of the State Division of Highways at Sacramento and to the Testing Engineer of the U. S. Bureau of Reclamation at Friant.

The Bureau Testing Engineer, J. J. Waddell presented a report of the tests at Friant; and a letter on the Sacramento tests from T. E. Stanton, Materials and Research Engineer of the State Division of Highways, was read.

The drying temperatures used by the Bureau were 130, 150, 180 and 212 deg. F. and by the State 120, 150, 180 and 230 deg. F. Four specimens from each pipe were tested by the Bureau, and two from each pipe by the State. Pipe furnished were from three yards using different aggregates and manufacturing methods so that the tests cannot be considered as uniformly representative.

However, with few exceptions, all tests showed the absorption less when lower drying temperatures were used, although a longer drying time is required as the drying temperature is lowered.

These tests further showed considerable variance in specimens from the same pipe, indicating that aggregates, mixing, compaction and curing individually or collectively affect the test results. It was believed worth while to refer this matter for further investigation to the Technical Problems Committee of the American Concrete Pipe Association.

Comparative tests for absorption on cored specimens and standard cut specimens were made on adjacent sections cut from 12-in. and 30-in. reinforced concrete pipe. The cores were cylinders 1 in. in dia. by 2 in. high, and the standard cuts were slightly less than 2-in. cubes. The exposed surface area and the volume of the

(Continued on page 188)

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Pipe Producers

(Continued from page 186)

cylinders were about $\frac{1}{2}$ that of the cubes, which means that the absorption of water per unit weight was more rapid for the cylinders than for the larger cubes. In both cases, surface areas were smooth and showed no fractures. The test results are as follows:

Size Pipe	Age	Cylinder	Absorption		Compression	
			Cube	Cylinder	Cube	Cylinder
12 in. r.c.p.	15 days	6.6	4.4	6300 lb.	6480 lb.	
30 in. r.c.p.	20 days	4.7	3.7	5870 lb.	6280 lb.	

Further tests will be carried out on larger diameter cylinders, as it is evident that if test results are not too dissimilar considerable savings can be made by the industry if the coring method can be used for obtaining absorption and compression test specimens, especially from large diameter long length pipe.

A letter from the California Association to the American Concrete Pipe Association was read agreeing with requests on file by their members to present the following suggested changes in A.S.T.M. Specifications to Committee C13: (1) The inclusion of other types of cement in all the specifications. (2) The inclusion of intermediate sizes in specifications for reinforced pipe. (3) The reductions of reinforcing steel areas specified to two decimals.

It was pointed out that a great deal of applied research was necessary in industry if it is to meet the advance of competition, new developments and industry problems. It was agreed that a considerable portion of funds should be allocated to research and improvement of industry practices. Among the subjects suggested for consideration in this program were expansion joints for irrigation lines; a study of the benefits obtained by the use of concrete irrigation pipe; testing procedures; industrial waste problems; installation practices, and precast septic tanks.

Aqueduct Pipe

On the second afternoon, Fred C. Scobey, Senior Irrigation Engineer of the U. S. Dept. of Agriculture showed pictures of and discussed the concrete pipe used on the San Diego aqueduct. He presented those interested with a tabulation of hydraulic tests on the concrete pipe, which developed surprisingly low friction coefficients. Distribution was made to those present of the revised 1949 "Design Construction and Operation of Concrete Pipe Irrigation Lines," which are available to members, and others interested on request and without charge.

Election of Officers

Business sessions of the local organization were held on the first

afternoon and the second morning during which the following officers and directors were elected: president, H. W. Chutter, Jourdan Concrete Pipe Co., Fresno; vice-president, Fred N. Linn, United Concrete Pipe Corp.; secretary-treasurer, Hugh Pollard, Pollard Bros., Ltd.; and A. M. Herman, Concrete Conduit Co., Colton, Wm. M. Hurst, Hurst Concrete Products, Santa Barbara, H. M. Tellyer,

Tellyer Pipe Co., Albuquerque, N. Mex., and H. W. Chutter, directors for three years.

Selection of Santa Barbara as the site for the fall meeting to be held in October brought the meeting to a close after which a cocktail party was held for the members and guests.

In the evening a dinner dance was held in the Hotel Fresno ballroom with over 100 members and guests in attendance, at which time, Gilbert D. Williamson, the only present active member of the original five-man board of directors in 1919, was presented with a suitably engraved electric desk clock.

Members of the board of directors met on the evening of February 16th to discuss finances and a budget for 1949. A motion was carried unanimously that, for the balance of 1949, 50 percent of the advertising budget be expended for irrigation pipe, instead of 33 1/3 percent as had previously been spent. More advertising space will be used, with larger pictures and improved copy in the irrigation advertising. It was further agreed that more research work should be done for the benefit of the industry and its members.

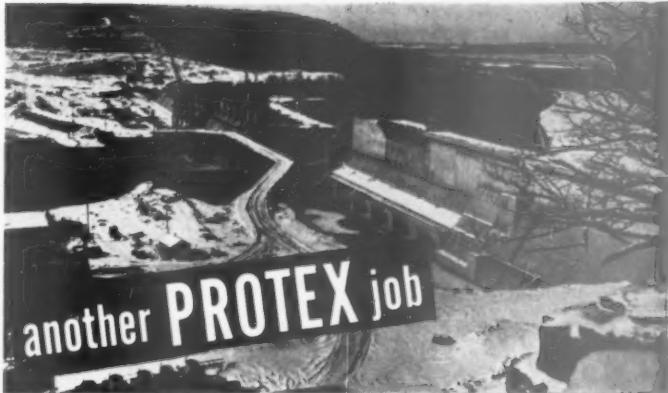
Registration

- H. B. Tellyer, Tellyer Concrete Pipe Co., Albuquerque, N. Mex.
- A. J. Gates, Gifford-Hill Pipe Co., Dallas, Tex.
- Harold Baker, Peerless Concrete Pipe Co., Yuma, Ariz.
- Walter Hartford, Concrete Conduit Co., Phoenix, Ariz.
- A. M. Herman, Concrete Conduit Co., Colton, Calif.
- M. W. Crouch, Peerless Concrete Pipe Co., Santa Ana.
- John Kristich, Kristich Bros., Watsonville.
- W. S. Frall, Kristich Bros., Soledad.
- G. D. Williamson, Valley Concrete Pipe & Prod., Yuba City.
- O. H. Price, Headsburg Concrete Pipe Co., Headsburg.
- Fred N. Linn, United Concrete Pipe Corp., Merced.
- H. A. Weigand, United Concrete Pipe Corp., Los Angeles.
- France Geary, W. E. Rodes, American Pipe & Construction Co., Oakland.
- R. J. McConnell, American Pipe & Construction Co., Los Angeles.
- C. V. Whalley, California Concrete Prod. Co., San Jose.
- Gen. Reedy, Nick Raggs, Reedley Cement Pipe Co., Reedley.
- F. Mangine, Vianalia Concrete Pipe Co., Visalia.
- R. R. Reynolds, Van Cleve Construction Co., Exeter.
- W. B. Fittman, McFarland Pipe Co., McFarland.
- Hugh Pollard, Pollard Bros. Ltd., Fresno.
- Fred K. Woolley, Pollard Bros. Ltd., Fresno.
- C. S. Sorenson, Raggio Concrete Pipe Co., San Jose.

Geo. Jurkovich, Porterville Cement Pipe Co., Porterville.
 J. E. Balem, United Concrete Pipe Corp., Merced.
 W. C. Tretton, United Concrete Pipe Corp., Woodland.
 H. O. Hilliker, Hilliker Concrete Pipe Co., Eureka.
 Leonard Dobbins, Fewell Concrete Pipe Co., Garden Grove.
 Rubin Arvis, Arvis's Concrete Pipe Co., Arvin.
 Fred Spiekerman, Ed Spiekerman Concrete Pipe, Lodi.
 C. J. Ragus, King City Concrete Pipe Co., King City.
 W. H. Hurst, Hurst Concrete Products, Santa Barbara.
 Frank Bonacich, San Jose Concrete Pipe Co., San Jose.
 Wm. S. Rogers, Rogers Materials Co., Madera.
 Edgar Nelson, Roscoe Land, Nelson Concrete Pipe Co., Porterville.
 J. E. Cooper, Cooper's Cement Pipe Co., Bakersfield.
 Jess Baker, H. B. DeFreet, Turlock Concrete Pipe Co., Turlock.
 J. O. Powell, Ken Williams, S. J. Valley Pipe & Constr. Co., Chowchilla.
 Nick Puglizovich, Eli & Nick's Concrete Pipe Co., Merced.
 Nick Vlachos, L. Siskovich, Clovis Concrete Pipe Co., Clovis.
 Orville Bennett, Kings County Cement Pipe Co., Armona.
 Glenn Black, Earl Church, Fresno Concrete Pipe Co., Fresno.
 P. J. Gilbert, Gibson's Concrete Pipe, Delano.
 H. W. Chutter, H. W. Martin, Jourdan Concrete Pipe Co., Fresno.
 Wm. J. MacKenzie, Tuerck-MacKenzie Co., Portland, Ore.
 Fred C. Sooley, U. S. Dept. of Agriculture, Berkeley, Calif.
 R. D. Reynolds, Imperial Irrigation Dist., Imperial.
 J. W. Rodner, E. C. Fortier, U. S. Bureau of Reclamation, Fresno.
 J. J. Waddell, R. A. Holmes, C. C. Mooney, U. S. Bureau of Reclamation, Friant.
 Henry Karrer, J. F. Sorenson, L. W. Milnes, Fresno Irrigation District, Fresno.
 Herrick Waterman, Waterman Industries, Inc., Exeter.
 T. K. Partridge, Southwestern Cement Co., Los Angeles.
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 Tom Travis, Monolith Cement Co., Fresno.
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 W. F. Fink, Kearney's Pattern Shop, San Jose.
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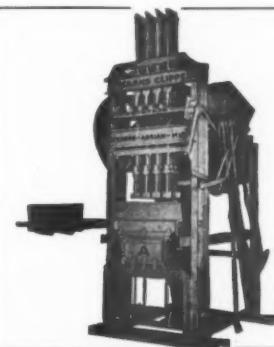
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California Concrete Masonry Manufacturers Annual Meeting

ROGER YOUNG AUDITORIUM, Los Angeles, was the scene of the 1949 annual meeting of the Concrete Masonry Manufacturers Association of California, held February 22, at which the following officers and directors were elected: president, Homer C. Shirley, Superior Concrete Block & Building Supply Co., Temple City; vice-president, William A. Grindle, San Joaquin Blocklite Co., Selma; secretary-treasurer, L. B. Garber, Pomona Concrete Block and Products Co., North Pomona; and directors, J. A. Allen, Hollystone Co., North Hollywood, E. P. Ripley, General Concrete Products Co., Van Nuys, J. H. Kennington, California Brick & Tile, Rosemead, C. D. Wailes, Jr., Wailes-Bogeman, Los Angeles, Mike M. Simovich, California Home Materials Co., Monrovia, Vern Gray, Perma Tile Concrete Products Co., Bakersfield, and Clif Hendrickson, secretary-manager.

Ray Cooley, Portland Cement Association, presented a color-sound film on concrete block construction, and H. F. C. Duberg, Merchants & Manufacturers Association, discussed labor relations.

Progress Report

In a progress report on the Association, it was stated that on January 1, 1949, the Association consisted of 12 regular members in good standing. On January 1, 1949, after a consistent membership drive, there were 95 regular members, 40 associate members and 2 honorary members, with total membership standing at 137. Since January 1, 1948, general meetings have been held once a month in various sections of the State.

Newspaper releases and national magazine write-ups were reported to be noticeably increasing the public acceptance of concrete masonry construction. The Association has a concrete block section in Building News



J. A. Allen, retiring president; Clif Hendrickson, secretary-manager; and Homer C. Shirley, newly elected president, of the Concrete Masonry Manufacturers Association of California

with over 5000 distribution, and is sending news releases once a month to over 300 newspapers in California. County, city, state and federal institutions with departments that advise on home construction are being contacted by the association and given late information on advantages of block construction; and all lending institutions also are being given news releases and pamphlets for their files.

Concrete Institute

(Continued from page 183)

Data regarding the results are not available for publication to date. However, the following speakers discussed the subjects indicated: D. W. Lewis, Purdue University, Joint Highway Research Project with State Highway Commission of Indiana, "Effect of restraint and durability characteristics on concrete aggregates"; T. B. Kennedy, Waterways Experiment Station, "Influence of aggregate on durability of mass concrete"; W. C. Hansen, Universal Atlas Cement Company, "Method for determining the air content of hardened concrete"; Elvind Hogestad, University of Illinois, "Bond tests with air-entraining con-



New officers and directors of the Concrete Masonry Manufacturers Association of California, left to right, are: J. H. Kennington, California Brick & Tile, Rosemead; C. D. Wailes, Jr., Wailes-Bogeman, Los Angeles; Secretary-Treasurer L. B. Garber, Pomona Concrete Block and Products Co., North Pomona; E. P. Ripley, General Concrete Products Co., Van Nuys; J. A. Allen, Hollystone Co., North Hollywood; Mike M. Simovich, California Home Materials Co., Monrovia; President Homer C. Shirley, Superior Concrete Block & Building Supply Co., Temple City; Vern Gray, Perma Tile Concrete Products Co., Bakersfield; and Secretary-Manager, Clif Hendrickson

crete"; H. S. Meissner, Bureau of Reclamation, "Protective and decorative coatings for concrete and masonry structures"; R. M. Mains, Cornell University, Cooperation with American Iron and Steel Institute, "Distribution of bond stress in embedded reinforcement"; A. E. Fatin, University of Michigan, "Electric strain gages inside concrete members"; M. J. Holley, Jr., Massachusetts Institute of Technology, "Some tests on prestressed spirally reinforced column specimens"; L. E. Vandergrift, Ohio State University, "Effect of internal temperature variation, shrinkage, plastic flow in causing modification of stress distribution near the computed position of contraflexure in the interior spans of continuous reinforced concrete slab bridges"; J. N. Thompson, University of Texas, "Characteristics of the stress-strain curve of concrete beyond the ultimate strength."

Friday afternoon, Herbert L. Gilkey, president of A.C.I., presided as chairman. Four papers were presented, the first two of interest to architects. These were: "Design Details for Architectural Concrete" by John J. Hogan, regional structural engineer, Portland Cement Association, New York, N. Y., and "Construction Practices for Architectural Concrete" by E. B. Oberly, construction superintendent, Portland Cement Association, New York, N. Y. Mr. Hogan's paper stressed the use of control joints and these, it developed, were intentional zones of weakness in concrete structures, so placed that when the concrete cracked, the opening would be hidden. He maintained that structures will crack, so why not design the building so that the crack will not show.

The last two papers were "Light-weight Aggregate Concrete" by Ralph W. Kluge, M. M. Sparks and E. C. Tuma, associate professor, structural engineering, Purdue University, Lafayette, Ind., (formerly with the National Bureau of Standards) and engineers, National Bureau of Standards, Washington, D. C. respectively; and "Developments in the Manufacture and Technology of Concrete Masonry Units" by Jay C. Ehle, production manager, Cleveland Builders Supply Co., Cleveland, Ohio. Mr. Kluge described results of a series of tests on light-weight aggregates, presenting slides showing the characteristics of the materials tested. In the discussion of this paper, Dr. F. O. Anderegg gave some interesting results obtained with perlite concrete. By controlling gradations even down in the 100-mesh range he was able to obtain concrete of considerably greater strengths than those reported by the main speaker. He also questioned why 1000 p.s.i. concrete for house foundations should be required when no such weights are required to be carried by such structures. A

(Continued on page 192)



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suggestion was made that durability might be the reason.

Mr. Ehle's paper was a very broad description of modern concrete block plants and of the machines used, with some emphasis being placed on modern curing practices. He said the industry sold about \$200,000,000 of concrete masonry units last year and that plant investment was about \$65,000 per million units produced. In excess of a billion units (8 x 8 x 16-in. equivalents) were manufactured and sold in 1948. He gave a history of the industry and brought out that the use of lightweight aggregates was in a great measure responsible for the industry's growth. He said that about 4 percent of total masonry units manufactured in 1948 were made on non-vibratory, or tamper-type machines. The balance were made on equipment that employs vibration under pressure.

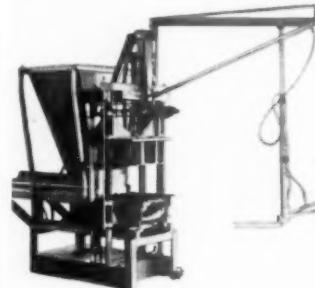
He described the high capacity machines in a general way and brought out that larger capacity machines were on the agenda for the future which would turn out 1200 to 1400 standard units per hour and require mixers of 100-cu. ft. capacity or more. Such developments, he said, will see a return to continuous mixers.

As was previously stated, Herbert J. Gilkey was elected president of the American Concrete Institute. Other officers and directors are: vice president, Frank H. Jackson, U. S. Public Roads Administration, Washington,

D. C.; vice president, Harry F. Thomson, St. Louis, Mo.; secretary-treasurer, Harvey Whipple, Detroit, Mich.; H. P. Bigler, Connors Steel Company, Birmingham, Ala.; R. W. Spencer, Southern California Edison Co., Los Angeles, Calif.; Myron A. Swayze, Lone Star Cement Corp., New York, N. Y.; Harmer E. Davis, University of California, Berkeley, Calif.; H. C. Delzell, Concrete Reinforcing Steel Institute, Chicago, Ill.; A. T. Goldbeck, National Crushed Stone Association, Washington, D. C.; N. M. Newmark, University of Illinois, Urbana, Ill.; Charles H. Scholer, Kansas State College, Manhattan, Kan.; George W. Wascha, University of Wisconsin, Madison, Wis.; Roderick B. Young, Hydro-Electric Power Commission of Ontario, Toronto, Ontario, Can.; Paul W. Norton, Boston, Mass.; Henry L. Kennedy, Dewey & Almy Chemical Co., Cambridge, Mass.; Harrison F. Gonnerman, Portland Cement Association, Chicago, Ill.; Stanton Walker, National Sand and Gravel Association, Washington, D. C.; and Robert F. Blanks, Bureau of Reclamation, Denver, Colo.

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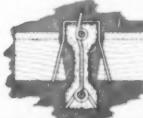
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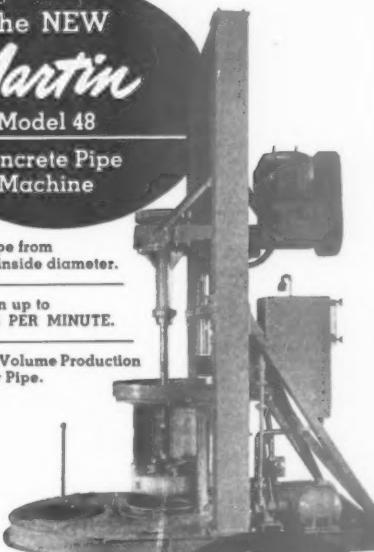
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Altoona, Pa.

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1—9' Blystone Mixer—New condition
1100—3½" x 7½" x 15½" Steel Pallets
1000—7½" x 7½" x 15½" 50% Sterns pallets
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ATLAS CONCRETE FORMS
Irvington FORM & TANK CORP.
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Walls • Cylinders • Floors • Sewers

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Cast iron or aluminum molds for making bird baths, flower urns, flower boxes, benches, sun dials and other ornaments. Block, tile and brick machines. WRITE

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Pneumatic off bearer with air compressor and 16" chimney block mold box with 400 Multiplex pallets, included. In good condition and many new spare parts—price \$4200.00. Anchor power stripper block machines. 2500—8" steel pallets code Dacoit each 42 cents.

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Including window and corners plus cores less shafts.

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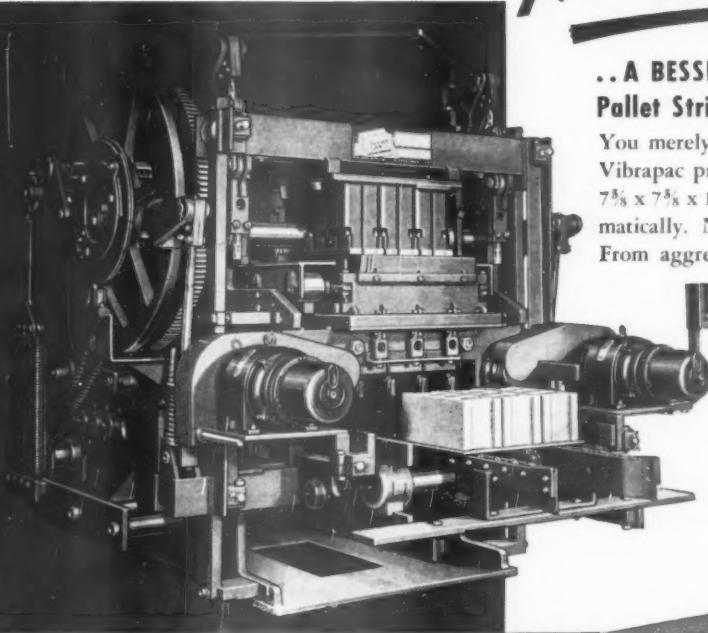
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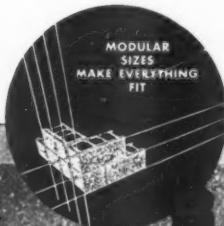
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a combination that's hard to beat



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J&C Model "CP" Brick Press



a prod

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CURING EQUIPMENT PLUS A
J & C BRICK PRESS.**

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*Another J&C 'First' /
Hydraulic Kiln Door Cuts Opening
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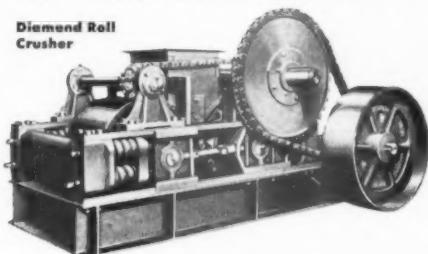
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opened, closed, and locked.

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CRUSHING USE . . .

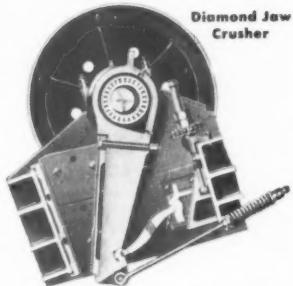


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Crusher

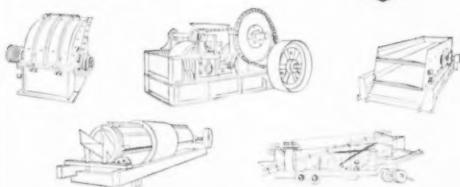


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10
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It's the
"Plus" features in
a product that contribute
largely to outstanding performance and
build user satisfaction and profits.

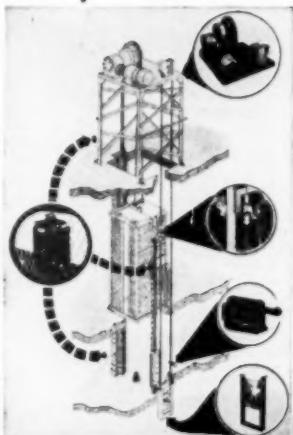
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6-inch
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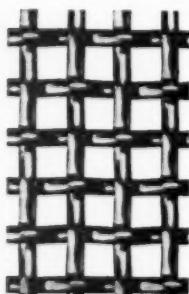
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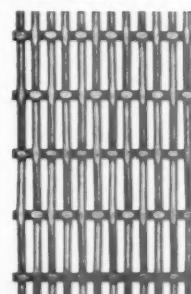
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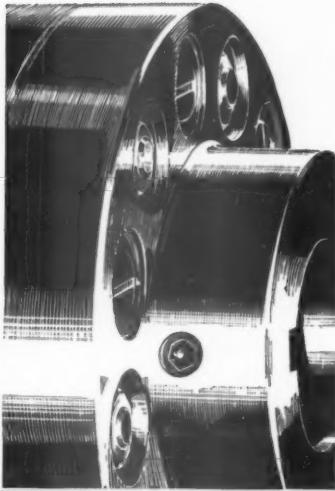
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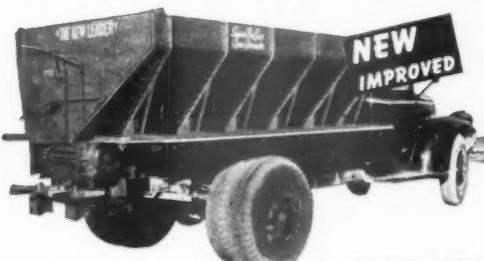
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American by
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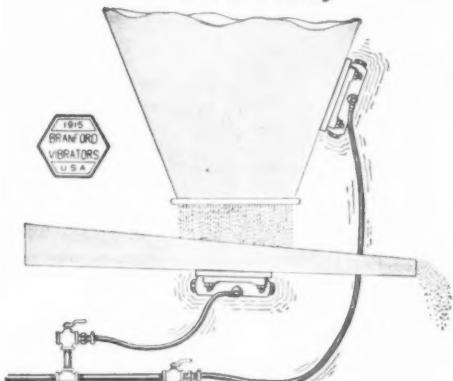
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Let a "BRANFORD"
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"BRANFORD" Vibrators

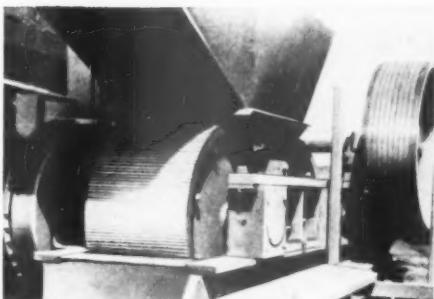
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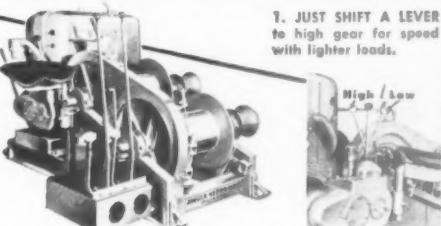
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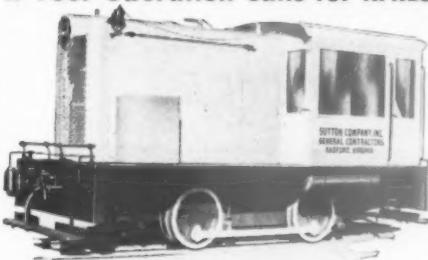
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or
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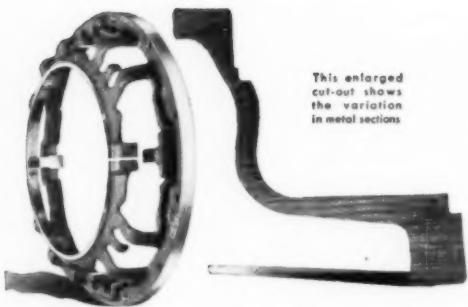
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This enlarged cut-out shows the variation in metal sections

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When several other foundries attempted to produce this part, scrap loss exceeded 30%. Eccentric shift, distortion, shrinkage and blowholes were often discovered after the casting had been machined. In spite of the high cost, Twin Disc engineers seriously considered redesigning the plate as a weldment.

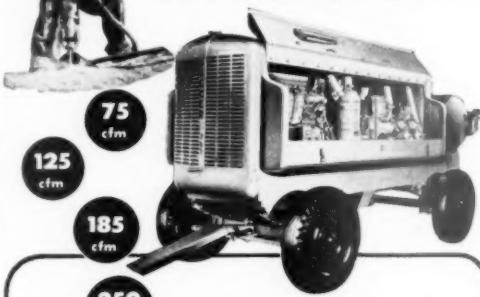
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1—American pulverizer with 125 HP direct connected motor
1—70 HP Marine type diesel engine, same as new
1—3 Drum Bucyrus steam hoist
All steel dredge boats, scows, tug boats and pig boats
Electric motors DC from 1 HP to 300 HP
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Cedar Rapids—two unit mobile crushing plant for crushing gravel, rock and coal, new, used only 200 hours. Immediate delivery.

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Real Values In Used Equipment Reconditioned—Ready to Work

Intl. TD-18 Diesel Tractor with Angledozer \$7,000.
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Bartlett-Snow Special No. 2; cyclo swing hammer pulverizer
Ding Magnetic Separator with 18" conveyor, complete with controls, etc.
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1—40 ft. Hopper Dredging Bucket.
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3—Steel Prefab. Ridge s., 20'x100'x200'.
1—30 ton Am. 6 wheel team loco.
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1—20 ton Blake Jaw Crusher.
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2—10 ton Steel Road Rollers.
1—80 ft. Cent. Pump.

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FEDERAL TRUCK TRACTOR
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Powered by H. B. CUMMINS MOTOR 150 H.P., \$8,000.00
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1-Bucyrus Erie 42T, diesel powered with 9" bits and tools.

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BOILER: 160 H.P., 90 lbs. pressure, complete with oil burner and control equipment. Portable.

PUMP: Worthington 40 H.P., steam driven Centrifugal Pump, 300 lbs. steam pressure, 300 GPM, with pump rod and piping complete in new condition.

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1-Piece 100 ft.

1-Piece 1017 ft.

1-Piece 268 ft.

42" wide, 100' lb. 42 or deck 7/32" too cover

1/16" bottom cover, on original reels. ALL NEW NATURAL RUBBER; with or without mechanical parts.

CRUSHING PLANT PORTABLE: Diesel powered.

GYARDY CRUSHERS: 14" complete with motor and drive.

1-Alfa Chalmers 9-K and 6-K. 1-Austin No.

1-Telmontith 14" complete with motor and V-belt drive.

1-Telmontith 14" complete with motor and V-belt drive.

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1-Traylor type TZ, size 36"; Allis Chalmers 45x20". NEW condition.

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KILNS, COOLERS, DRYERS: 1-Single shell 34"x29 ft. complete with drive, burner; no motor. 1-5x50' brick lined Kiln.

DERRICK: Hyd. 15 ton, 3 stage, 80 H.P. motor, 4500 rpm, with 100' steel line. Ferringbone gear with motor and V-belt drive.

KILNS, COOLERS, DRYERS: 1-Single shell 34"x29 ft. complete with drive, burner; no motor. 1-5x50' brick lined Kiln.

DERRICK: Hyd. 15 ton, 3 stage, 80 H.P. motor, 4500 rpm, with 100' steel line. Ferringbone gear with motor and V-belt drive.

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MINE HOISTS: Single and double drum, 150 H.P., 1000 ft. per min. 600 H.P., 800 ft. 900 H.P., and 1000 H.P. All complete with motors and control equipment.

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1-14" Superior McCully Gyrocrusher, Ser. 8167. As is, where is, including all spare parts on hand—\$3,000.

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Marion Tug 27-Electric—1 1/2 yd. Bu. Er. 27 ft.—Comb. 1 1/2 yd.; Lima 1201 Dragline—3 Yard; Lima 503 1/2 Shovel and Drag. Others. Euclid end dump and bottom dump—Tournawagons—Super C tournaulps.

Standard grader std. #2 Gas or Diesel Long—24, 28, 33 in. long. 10' wide. 100 ft. 30 Ton. Dump Cars 35 Cu. Ft., 180 Cu. Ft., 20 cu. ft. One Cars 816. Gs. 50 tons.

Rotary Klins—14' and Mills—18"-30" Gyrocrushers—Ser. 8167. Roll Crushers—400" Gusher Hammermill—9285, 10234, 10238, 14x24, 18x36, 20x36, 24x36, 30x42, 40x42, 42x50 Jaw Crushers—Ser. 8100. 10' x 18' 1000 H.P. Double Gyrocrusher—Ser. 8167. Screeners std. and double and triple dx. Feeders 10x16, 20x20—Door Classifiers—Cent. pump—Deep well pump—Tuggers—Mine hoists—75, 100, 150 ft. H.P. 100 ft. 100 ft. 100 ft. Conveyors—Portable Gravel Plants—Road rollers—Wagon Drills—Bu. Er. 20T and 42T Blast Hole Drills—Many other items.

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CONVEYOR BELTING
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GYRE, FIRE, WATER, AIR,
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DUCTS ARE NEW, GUAR-
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CONVEYOR BELTING

ABRASIVE RESISTANT COVERS

Width Ply Top-Bottom Covers

48" — 8 — 1/8" — 1/16"

42" — 5 — 1/8" — 1/16"

36" — 6 — 1/8" — 1/16"

30" — 6 — 1/8" — 1/16"

30" — 5 — 1/8" — 1/16"

26" — 5 — 1/8" — 1/32"

24" — 5 — 1/8" — 1/32"

Width Ply Top-Bottom Covers

24" — 4 — 1/8" — 1/32"

20" — 5 — 1/8" — 1/32"

20" — 4 — 1/8" — 1/32"

18" — 4 — 1/8" — 1/32"

16" — 4 — 1/8" — 1/32"

14" — 4 — 1/16" — 1/32"

12" — 4 — 1/16" — 1/32"

Inquire For Prices — Mention Size and Lengths

TRANSMISSION BELTING

ENDLESS

HEAVY-DUTY FRICTION SURFACE

Width Ply Width Ply Width Ply

18" — 6 — 10" — 6 — 6" — 5

16" — 6 — 10" — 5 — 5" — 5

14" — 6 — 8" — 6 — 4" — 5

12" — 6 — 8" — 5 — 4" — 4

12" — 5 — 6" — 3" — 3" — 4

"A" Width All Sizes —

"B" Width All Sizes —

"C" Width All Sizes —

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Sold in Matched Sets.

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FIRE HOSE

APPROVED SPECIFICATION HOSE EACH LENGTH WITH COUPLINGS ATTACHED

I.D. Size Length Per Length

2 1/2" — 50 feet — \$28.00

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2" — 50 " — 23.00

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1 1/2" — 50 " — 20.00

— 25 " — 11.00

Specify Thread On Couplings

AIR HOSE

I.D. Size Length per Universal Couplings

1/2" — 25 feet — \$5.00 — \$1.50 Pair

— 50 " — 10.00 — 1.50 Pair

3/4" — 25 " — 7.50 — 1.50 Pair

— 50 " — 15.00 — 1.50 Pair

1" — 25 " — 10.00 — 1.50 Pair

— 50 " — 20.00 — 1.50 Pair

LARGER SIZES ALSO AVAILABLE

All Prices—Net — F.O.B. New York

WATER HOSE

I.D. Size Length per Length

3/4" — 25 feet — \$4.25

— 50 " — 8.00

1" — 25 " — 6.25

— 50 " — 12.50

1 1/2" — 25 " — 7.50

— 35 feet — \$10.50

— 40 " — 12.00

— 50 " — 15.00

— 25 " — 10.00

— 35 " — 14.00

— 50 " — 20.00

Each Length with Couplings Attached

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One Worthington, single horizontal tandem three stage air compressor, serial No. L-43438. Purchased 1941. Size 10/6—1/4—2—3/8 x 11. Equipped with lubrication and air filter. First stage 100 psi. Second stage 350 psi. Third stage 1200 psi. Price \$5500.00, FOB Barberton Plant loaded on flat cars. Condition Good. No performance or other guarantee. For inspection contact purchasing dept..

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Colonial Chemical Division,
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USED STEEL PIPE

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GAS, WATER LINES, PILING,
SHOT HOLE CASING, 2" to 20"
Large quantities available.

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SCREENS

4'x8' 1-deck Tyler type 400 ton screen
15'x18' 1-deck Vibrating Screen
3½'x8' and 3½'x10' New Universal Vibr. screens
3'x8' 2-deck Sero Vibrating Screens (2)
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New Mechanism for 4' Link-Belt type P-D screen

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10"x14" Earle C. Boston Jaw Crusher No. 3-C
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15"x18" 1-deck Heavy Duty Grindermill
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42"x50" Trough Belt Conveyor
30"x18" New Trough Belt Conveyor
30"x18" Heavy Duty Apron Feeder
30"x18" Link-Belt Apron Feeder
30"x18" New Link-Belt Apron Feeder
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Apron Feeders, 10' and 30' wide
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6" to 12" diam. Screw Conveyors
New and Used Conveyor Belts
Full Line Hopper Feeders
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Syracuse Vibrator, Model V-200
Syracuse Vibrator Feeder, type FM-2-A-05

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Chains: 88-100, 110-117, 125-132, C-110, C-111,
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No. 544 Chain with 16" pitch
200' long.
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New Jeffrey No. 933 Thimble Steel Roller Chain
500' of No. 535 Chain with 16" pitch
14" pitch
14" pitch
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Burke Elevator in Double-End Chain
12" to 18" pitch
Electric Chain Belt or Chain
Enclosed, Shared and Continuous type Elevators
New and Used Belts, Buckets and Sprockets

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60 Selected size Gear Reducers, to 75-hp.
Gear Motors, Motors and Engines
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20' span Mats 3-motor Overhead Crane, 10-ton

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1-36" Telesmith Model SB Crusher
with 25 HP BB Motor and V-belt
drive. Late Model. LIKE NEW!
Will sell under factory guarantee.
1-3" Traylor TY fine reduction
crusher; short head and special
concaves. LIKE NEW!
1-18"x38" Wheeling Roller Bearing
jaw crusher; New jaws.
1-15"x24" Universal Jaw Crusher.
Reconditioned and guaranteed.
1-110 ton Cap. S-A Style F Feeder.
1-18" Dings Magnetic Pulley and
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1-30 KW 3 phase 440/220/110 V
generator d.c. to 65 HP International
Mod. UD14 Diesel Engine.
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with chains and overhead sheaves.

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¾ yd. Yann dragline bucket, closed
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Price \$6000.00 F.O.B. Ada, Okla.

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MINE AND SLOPE HOISTS

1-20,000 lb. Vulcan Dbl. Drum AC
1-35,000 lb. Nordberg Sgl. Drum AC
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2-No. 800B Pitman, 6'w
1-12x18 Eagle Dbl. Roll

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1-1000 lb. 20' Headway Sgl. Roll

1-10x20 Universal Sgl. Roll Portable

1-24x40 Penn Sgl. Roll

No. 1000 20' Headway Sgl. Roll

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1-40x22 Pioneer Dbl. Roll with Hopper

1-40x22 Pioneer Dbl. Roll w/ Air

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1-Ken. Van Saun Gyratory, complete, AC

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Units, 75 to 900 kw. Diesel and steam engines

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Diesel Power Unit, 40' boom

1-4 yd. Page Diesel D/L crane

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1-10 ton IBM Steam Loc. Crane 60 ft. boom,

rebuild 1950

1-22½ ton LB Steam Loc. Crane, 50 ft. boom,

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CINDER CRUSHERS VIBRATING SCREENS SCALES AND CONVEYORS FEEDERS BALL BEARING IDLERS

Prompt Shipment - Reduced Prices

3-roll Idlers: 14" belt width\$21.00
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18" belt\$22.30
24" belt\$23.40
30" belt\$24.90
36" belt\$26.00
42" belt\$27.30
48" belt width\$28.50
1-roll Idlers: 24" belt width\$23.35
30" belt\$24.90
36" belt\$26.00
42" belt\$27.00
48" belt width\$28.15
Belt Conveyors\$665.00
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Cinder Crusher—10 to 20 ton	capacity per hour
Large Cinder Crusher: 25 to 50	ton capacity per hour
20 ton truck scales\$1074.00
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15 ton truck scales\$450.00
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Vibrating screens, 2' to 5' wide many lengths, 1 to 5 decks. All with screen cloth or plates to customers' specifications.	
Priced from\$395.00

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Two ME600 Murphy Diesel power units. One used 6 months and one used 90 days. Both rebuilt and complete with clutch, sheave, etc.

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One D-4 Caterpillar Trackson Loader with one yard bucket—used 3 years in good condition.
1-30 yd. steel gravel bin.

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1-45' Dragline Boom and ¾ yd. bucket with 20' extra extension Fairlead & Cables. Flts 301 Koehring. \$900.00.

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GYZMATOR: 30" Super. McCully: 38" Allis-Chalmers; also Nos. 12, 10, 9, 8, 7½, 6, 5, & 4.

I.A.W. TYPE: 24x30, 25x30, 22x30, 30x32, 42x38,

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REDUCTION: 30" Super. & Symons Cone;

Nos. 19, 25, 37 & 53 Kennedy: 36" Traylor TZ,

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ROLLS: Allis-Chalmers 72x30, 54x24, 54x20, 40x

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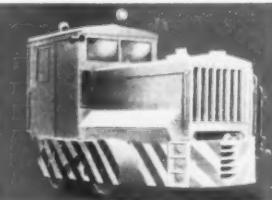
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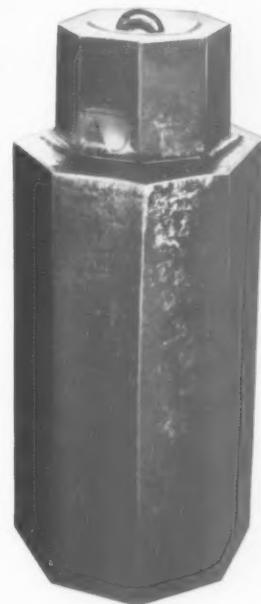
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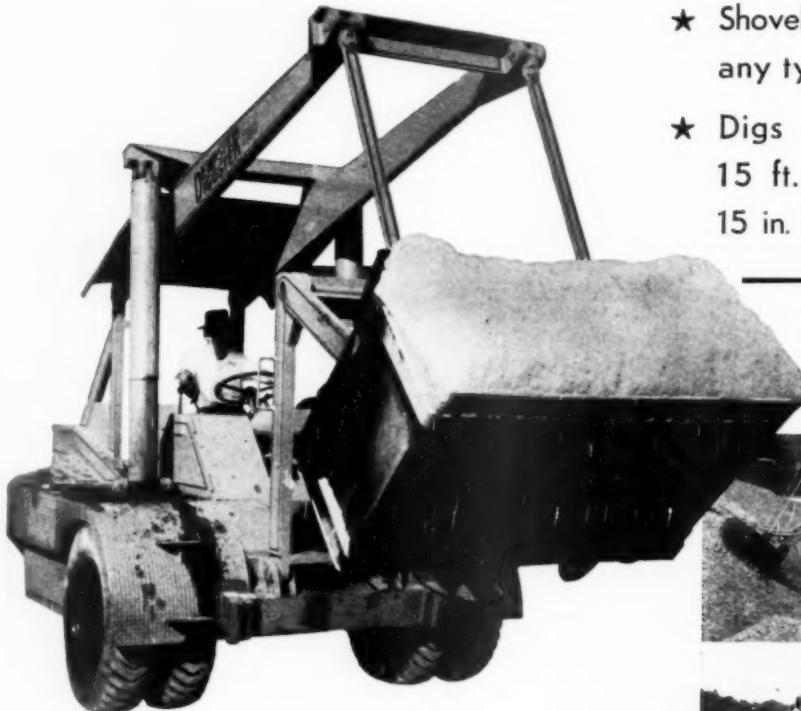
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15 ft. above and
15 in. below grade



Here is a rubber tired automotive shovel that is equally at home in excavation work; in stockpiling, loading or on the road. It is the most compact and maneuverable, one-man-operated, rubber tired automotive shovel and loader available. It is the only machine built with simultaneous but independent hydraulic crowd and hoist action. Variable crowd action at any dipper position means it can dig lower—15 inches below grade. Exclusive hoisting action

means it can dig higher—digs out a 15 ft. bank. Extraordinary dumping height and reach means easier loading, even distribution of load in the largest of trucks. Dempster-Diggster buckets are easily interchangeable. For digging, a 1 cu. yd. (heaped) bucket with hardened steel teeth is used. For loading work, stockpile buckets are available in 1 1/4, 1 1/2 and 2 cu. yd. capacities. Hoisting, Crowding, Steering and Braking are all 100% hydraulic.

*Large photo above shows close-up of Dempster-Diggster with 1 1/2 cu. yd. digging bucket loaded. At right, top: Loading crushed stone. Center: Diggster dumps crushed stone into truck. Right, bottom: Digging out a high bank.
Write today for complete information.*

**DEMPSSTER
BROTHERS
INC.**

349 N. KNOX, KNOXVILLE 17, TENN.



In coral rock . . .

Dual Impact Action does it again!



When the Miami Crushed Stone Company, Coral Gables, Fla., switched from 3 old-fashioned crushers to a single New Holland Model 3030 Double Impeller Breaker, they expected it to do the job . . .

But they didn't expect savings like this . . .

Read what G. D. Monroe, president, says about his New Holland:

"We are handling a very abrasive coral rock . . . breaking it down to minus one inch.

". . . our maintenance and power cost in operating the machine over the three it replaced has amounted to a considerable saving."

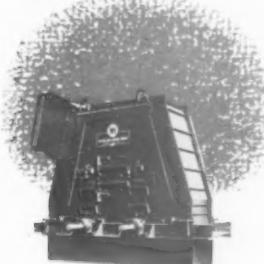
Now...one does the work of three

And so it goes. In quarries and pits all over the world, working on different types of stone, the record is the same for *Dual Impact Action* . . . higher production, lower cost.

Why is this? Advanced design, for one thing; it assures maximum output with minimum power. Another is superior construction, with lower maintenance.

New Holland Double Impeller Breakers come in four sizes—1212, 2020, 3030, 5050: are easily adapted to open or closed circuit.

Whatever your crushing problems—take them up with New Holland engineers. No obligation, of course. Write Department R-49 for full information.



High lights—New Holland Model 3030 Breaker:

Takes run-of-quarry rock, all sizes passing 30" opening. Yields clean cubical aggregate minus 1" in one pass—75 to 200 tons per hour. Construction: all-plate steel. Power required: .75 to 150 h.p.



NEW HOLLAND DOUBLE IMPELLER BREAKERS

NEW HOLLAND MANUFACTURING COMPANY, MOUNTVILLE, PA.

Affiliate of The Sperry Corp.



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"BOUNCE" Off Goodyear's
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Now Goodyear offers you a radically improved line of Redwing Air Hose — a hose with a cover that is tire-tread tough, yet cushiony enough to resist heavy impacts without cutting or gouging. Hard knocks, digs, abrasion and wear literally "bounce" off this brilliant red stock. It's a rugged, springy protection that brings you longer, better air hose service in rough-and-tumble mining, quarry and construction use.

Under this new, super-strong resilient cover, there's more strength and durability to make Redwing your best buy in air hose. Multiple ply, high tenacity, rayon cord rein-



forcement gives the body a combination of toughness and flexibility that makes Redwing Air Hose easily handled and always dependable. And the seamless tube is proof against hot or cold lubricants that cause ordinary hose to swell and flake.

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